TC-458

E Model
US Model

STEREO TAPECORDER

SPECIFICATIONS

Power Requirements: AC 120 V, 60 Hz, 41 W (USA)
AC 100, 110, 120, 127, 220 or 240 V, 50/60 Hz, 41 W (E)

Track System: Four-track two-channel stereo or monaural

Reels: 180 mm (7 inches) or smaller

Tape Speed: 19 cm/s ($7\frac{1}{2}$ ips), 9.5 cm/s ($3\frac{3}{4}$ ips)

Recording Time: 1.5 hours total at 19 cm/s $7\frac{1}{2}$ ips), stereo recording with 550 m (1,800 ft.) tape

Frequency Response: (with SONY SLH tape)
According to NAB standards:
20 ~ 30,000 Hz at 19 cm/s ($7\frac{1}{2}$ ips)
30 ~ 25,000 Hz ± 3 dB at 19 cm/s ($7\frac{1}{2}$ ips)
20 ~ 20,000 Hz at 9.5 cm/s ($3\frac{3}{4}$ ips)
According to DIN standards:
20 ~ 25,000 Hz at 19 cm/s ($7\frac{1}{2}$ ips)
30 ~ 20,000 Hz ± 3 dB at 19 cm/s ($7\frac{1}{2}$ ips)
20 ~ 17,000 Hz at 9.5 cm/s ($3\frac{3}{4}$ ips)

Signal-to-Noise Ratio: 56 dB (with SONY SLH tape)
53 dB (with standard tape)

Wow and Flutter: 0.06 % (RMS) weighted at 19 cm/s ($7\frac{1}{2}$ ips)
0.10 % (RMS) weighted at 9.5 cm/s ($3\frac{3}{4}$ ips)

Overall Distortion: 1.2 %

Record Bias Frequency: Approximately 160 kHz

Inputs: MIC (2)
Impedance: low
Maximum sensitivity: −72 dB (0.19 mV)
LINE IN (2)
Impedance: 100 kΩ or more
Maximum sensitivity: −22 dB (60 mV)

Outputs: LINE OUT (2)
Impedance: 10 kΩ or more
Level: 0 dB (0.775 V) with 100 kΩ load
HEADPHONE
Impedance: 8 Ω
Level: −28 dB (31 mV)

REC/PB (DIN) Connector (E): Input impedance: 10 kΩ or less
Output impedance: 10 kΩ

Heads: Record: RF140-2902
Playback: PF140-4202
Erase: EF18-2902A2

Motor: IC-624G

Semiconductors: 1 IC, 2 FETs, 58 transistors, 37 diodes

Dimensions: 412 (w) x 401 (h) x 201 (d) mm
$16\frac{1}{4}$ (w) x $15\frac{13}{16}$ (h) x $7\frac{15}{16}$ (d) inches

Weight: 15 kg, 33 lb

SONY®
SERVICE MANUAL

TC-458

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When ordering replacement parts, use PART NUMBERS listed in Parts List or shown in EXPLODED VIEWS.
Parts List reference numbers should not be used.

MODEL IDENTIFICATION

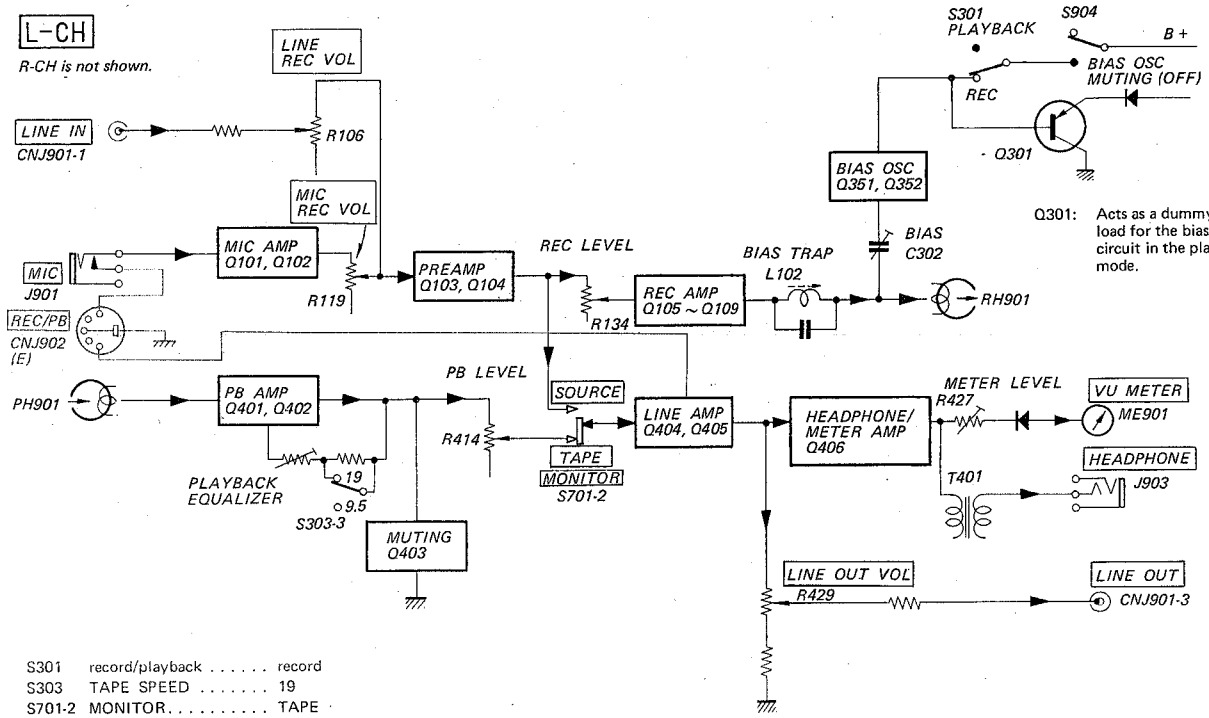
(See specification label.)

Model	*Identification on specification label*
USA	AC 120 V 60 Hz 41 W SUPERSCOPE
E	AC 100, 110, 120, 127, 220, 240 V 50/60 Hz 41 W

SECTION 1
OUTLINE

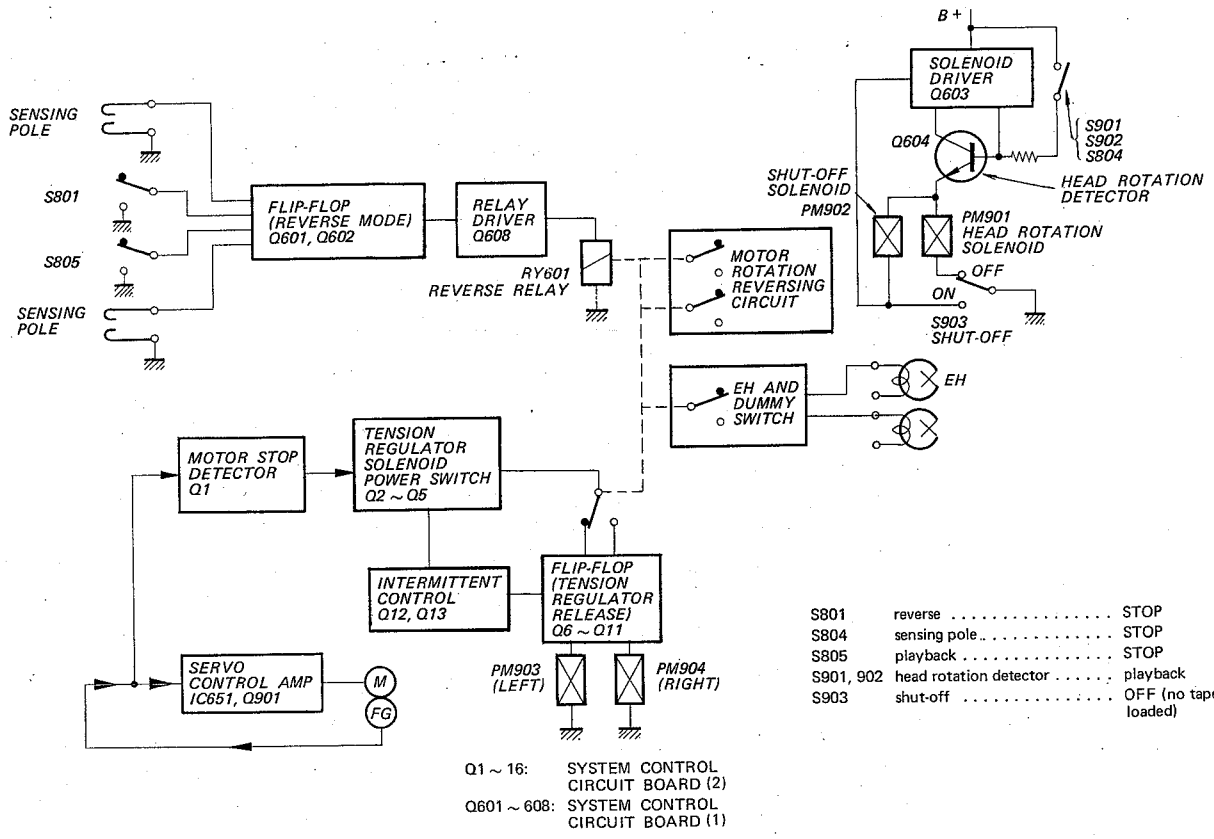
1-1. BLOCK DIAGRAM

– Amp Section –



S301 record/playback . . . . . record
S303 TAPE SPEED 19
S701-2 MONITOR. . . . . TAPE
S904 bias osc muting . . . . . OFF

– System Control Section –

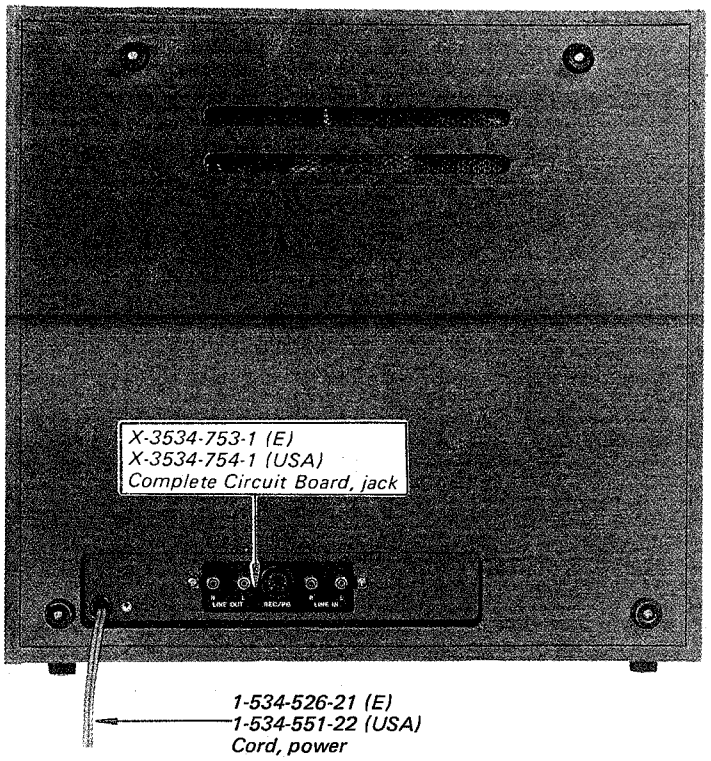


Q1 ~ 16: SYSTEM CONTROL CIRCUIT BOARD (2)
Q601 ~ 608: SYSTEM CONTROL CIRCUIT BOARD (1)

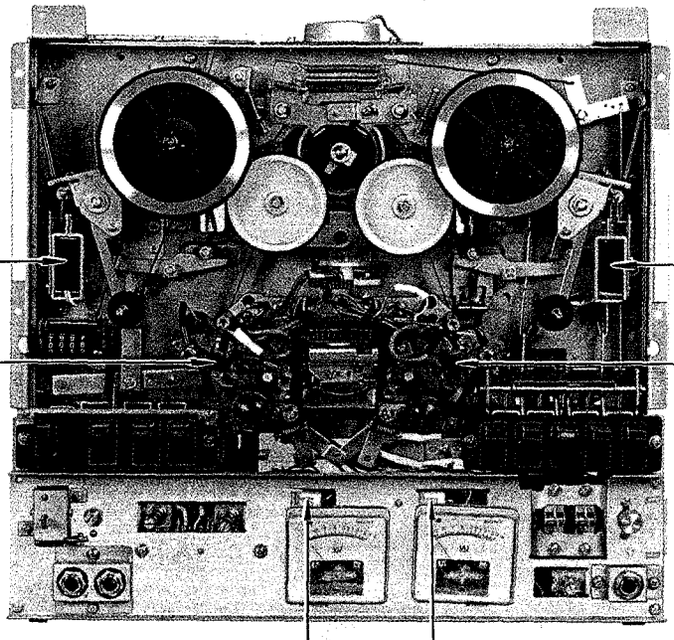
S801 reverse . . . . . STOP
S804 sensing pole . . . . . STOP
S805 playback . . . . . STOP
S901, 902 head rotation detector . . . . . playback
S903 shut-off . . . . . OFF (no tape loaded)

1-2. EXTERNAL VIEW (1)

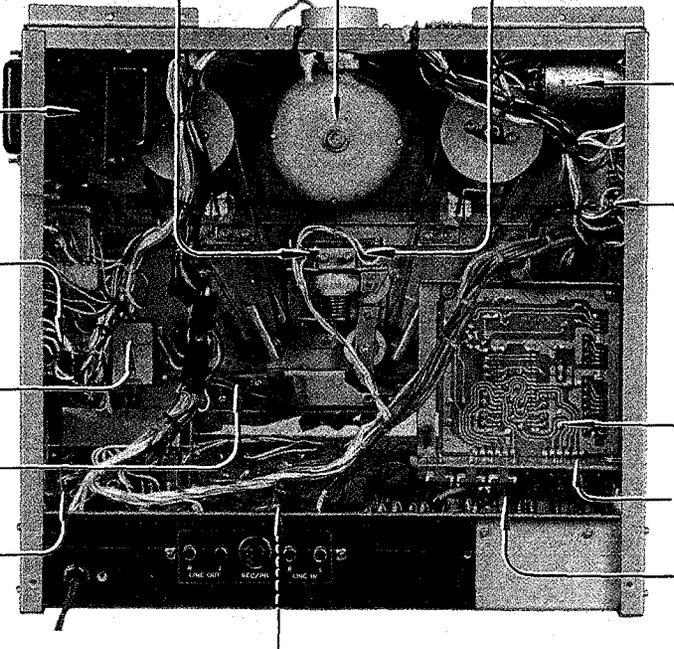
1-3. EXTERNAL VIEW (2)



1-4. INTERNAL VIEW (1)



1-5. INTERNAL VIEW (2)



SECTION 2
DISASSEMBLY

2-1. REEL TABLE PANEL ASS'Y, CONTROL PANEL ASS'Y AND CABINET ASS'Y REMOVAL

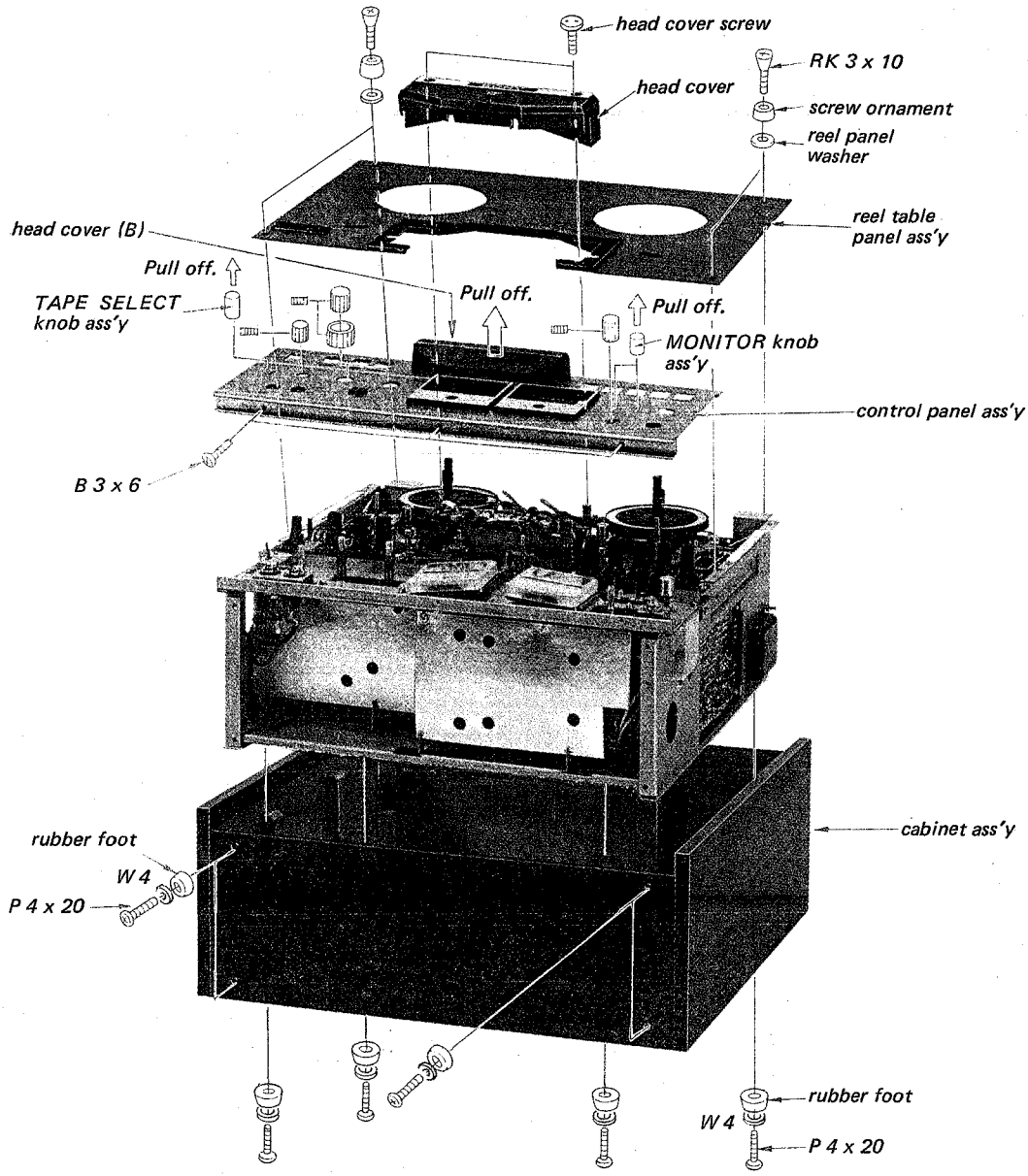


Fig. 2-1.

2-2. CLUTCH DISK ASS'Y REMOVAL

Remove retaining ring E4 and remove the clutch disk ass'y by turning it in the direction shown by the arrow in Fig. 2-2. When reattaching the clutch disk ass'y, reattach it by turning in the same direction.

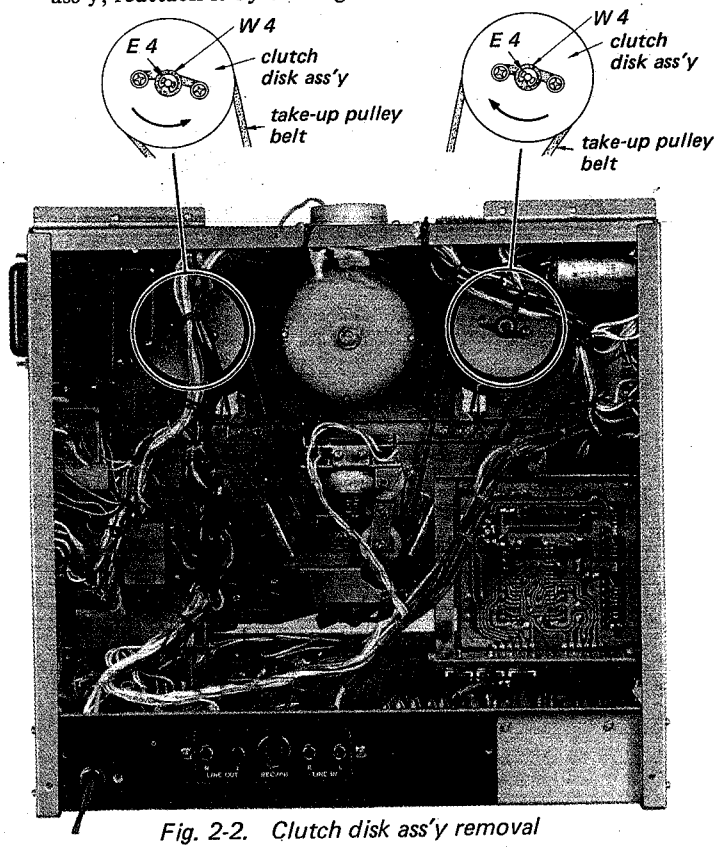


Fig. 2-2. Clutch disk ass'y removal

2-3. DRIVE BELT REMOVAL

1) Remove two take-up pulley belts.

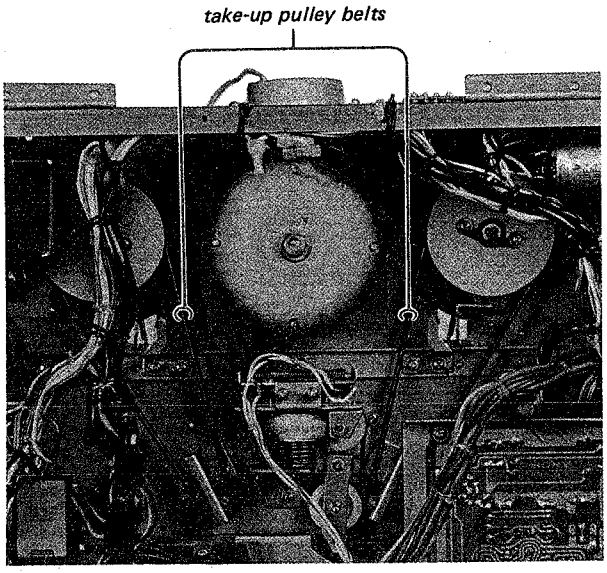


Fig. 2-3. Take-up pulley belt removal

2) Remove three screws which are fixing the head base unit ass'y as shown in Fig. 2-4.

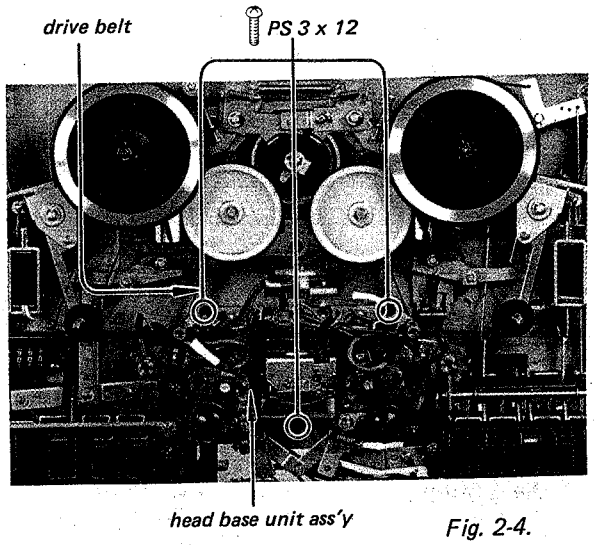


Fig. 2-4.

3) Remove the pinch roller cap, retaining rings and washers as shown in Fig. 2-5.

4) Pull off the pinch roller together with levers.

5) Remove the drive belt from the motor pulley ass'y.

6) Lift up the head base unit ass'y and remove the drive belt under the head base unit ass'y.

Note: After drive belt replacement, clean the drive belt, pulleys, pinch roller and capstan.

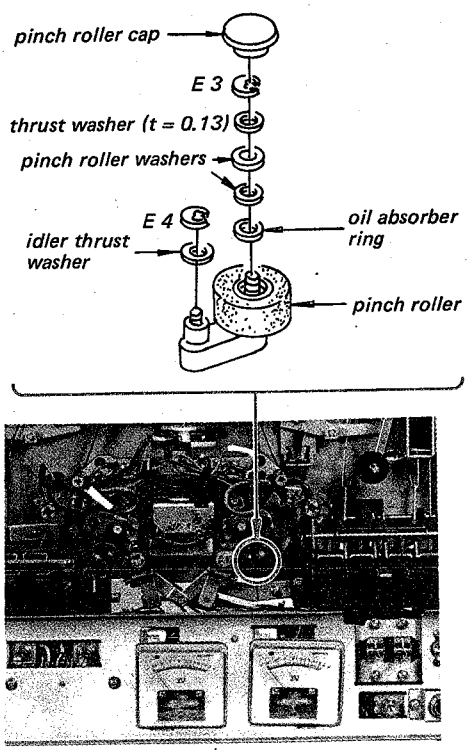
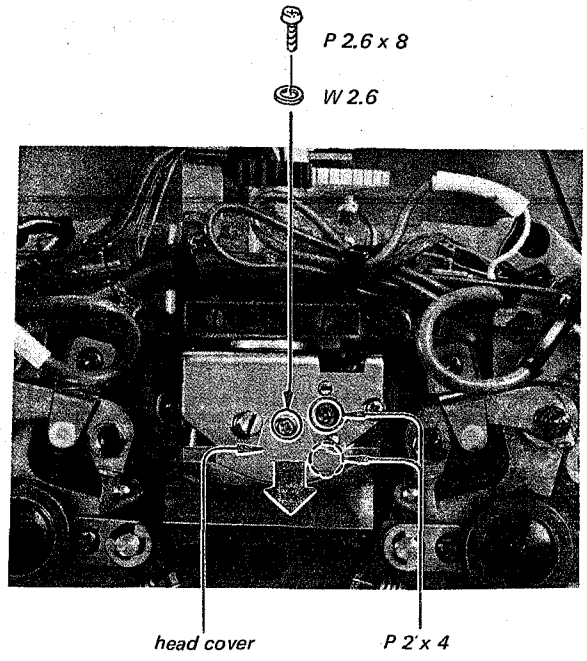


Fig. 2-5.

2-4. RECORD AND PLAYBACK HEADS REMOVAL

1) Remove head cover by removing two machine screws, P 2.6 x 8, and two washers, W 2.6.

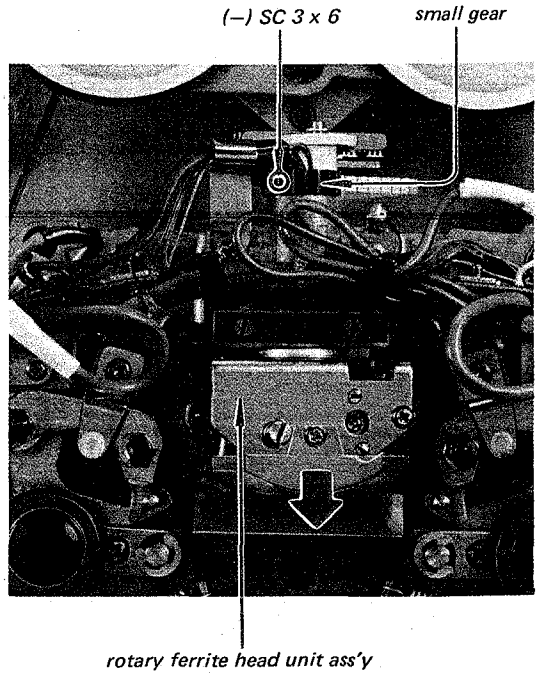
2) Remove two machine screws, P 2 x 4.



Note: When the record head is replaced, perform "1. Record Head Adjustment after Record Head Replacement" on page 23. When the playback head is replaced, perform "2. Playback Head Adjustment after Playback Head Replacement" on page 25.

2-5. ROTARY FERRITE HEAD UNIT ASS'Y REMOVAL

Loosen small gear setscrew and remove the rotary ferrite head unit ass'y in the direction shown by the arrow.



SECTION 3
ADJUSTMENTS

3-1. TROUBLESHOOTING

Trouble	Possible Cause	Remedy
No motor rotation	Incorrect position of motor switch (S906)	Readjust motor switch position.
	Defective motor switch (S906)	Replace motor switch.
	Defective servo amp or defective Q901	Check servo amp complete circuit board or Q901.
	Defective motor or defective contacts (3, 4, 7 and 8) of RY601	Replace motor or clean contacts of RY601, or replace RY601.
	Defective servo control power switch (S802)	Clean contacts or replace switch.
Too fast speed in forward and reverse modes	Incorrect operation of servo release switch S803 or run away of servo amp	Check S803 and servo amp circuit.
No or too slow fast forward and rewind	Incorrect rewind and fast forward torque adjustment	Readjust rewind and fast forward torque.
	Incorrect clutch release lever adjustment	Readjust clutch release lever position.
	Servo amp circuit is connected to the motor due to incorrect operation of servo control release switch S803	Check and replace switch.
	Supply-side tension regulator is not released	Readjust tension regulator back tension and check solenoid PM903.
Tape run away in PAUSE mode	Too much forward and reverse torque	Readjust take-up torque.
	Incorrect pause lever (B) ass'y position	Perform pause lever adjustment (1).
	Incorrect pause lever (B) position	Perform pause lever adjustment (2).
Tape scraping on reel flanges	Bent or damaged flanges	Use new reel.
	Incorrect height of tape path	Check and perform tension arm cap adjustment.
Electrostatic noise	Incorrect discharger position	Check and readjust discharger position.
	Electrostatically charged drive belt	Apply antistatic liquid to drive-belt surface.
No recording and no playback, or recording and playback during ferrite head unit rotation	Faulty muting circuit	Check S904, D619, Q403, Q503 and associated muting circuit components.
	Unreleased head rotating solenoid PM901	Check and replace detector switches S901 and S902, Q603 and/or Q604.
No auto shut-off	Incorrect actuator rod position	Check and readjust position.
	Incorrect position of shut-off solenoid PM902	Check and readjust position.
	Defective transistor Q603 and/or Q604	Check and replace Q603 and/or Q604.

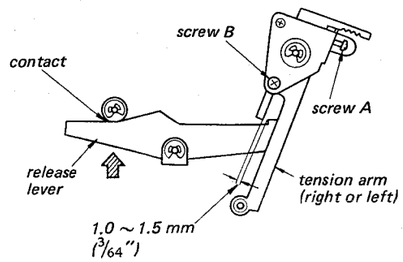
Trouble	Possible Cause	Remedy
• No reverse operation (manual or auto) • No ferrite head unit rotation • No reversible motor rotation	Defective reverse microswitch S801 and forward microswitch S805.	Check and replace S801 and/or S805.
	Dirty sensing poles	Clean sensing poles.
	Defective Q603 and/or Q604, or defective head rotation solenoid PM901	Check and replace Q603, Q604 and/or PM901.
	Faulty flip-flop for reverse circuit	Check and replace Q601 and Q602.
	Defective reverse relay RY601 or defective transistor Q608	Check and replace RY601 and/or Q608.
	Incorrect position of head rotation solenoid PM901	Check and readjust position.
No lever locking	Shut-off microswitch S903 does not switch to ON and shut-off solenoid PM902 does not release	Check and replace microswitch.
	Incorrect actuator rod position	Check and replace microswitch.
	Incorrect position of shut-off solenoid PM902	Check and readjust position.
Shut-off in reverse playback mode due to tape slack	Faulty tension regulator	Check right and left tension regulator changeover operations.
	Incorrect position of tension arm ass'y	Check and readjust tension arm ass'y position.
	Incorrect back tension of tension regulator	Check and readjust back tension.
No tension regulator	Defective contacts 2 and 6 of reverse relay RY601	Check contacts and replace relay.
	Faulty flip-flops in system control circuit (2)	Check Q4, Q5, Q6 and Q7 and replace defective transistor.
	Defective tension regulator solenoids PM903 and PM904 or defective solenoid driver transistors Q8, Q9, Q10 or Q11	Check and replace defective solenoid or transistor.
	Incorrect position of tension regulator solenoid PM903 or PM904	Check and readjust position.

3-2. MECHANICAL ADJUSTMENTS

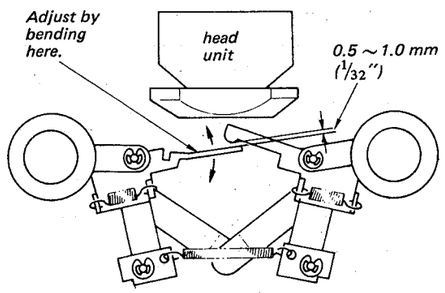
3-2-1.

Tension Arm Adjustment
– Stop Mode –

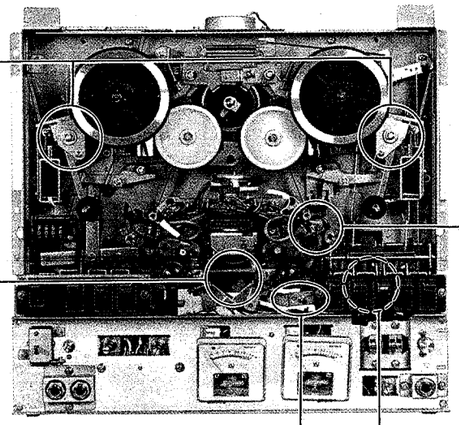
1. Loosen the screw B and push the release lever in the direction shown by the arrow.
2. Adjust by turning the screw A for the clearance shown.
3. Tighten the screw B.



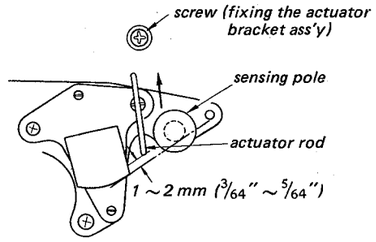
Pinch Roller Lever Adjustment
– Forward and Reverse Playback Modes –



After the adjustment, make sure that both pinch roller levers do not contact in stop mode.



Actuator Adjustment
– Stop Mode –

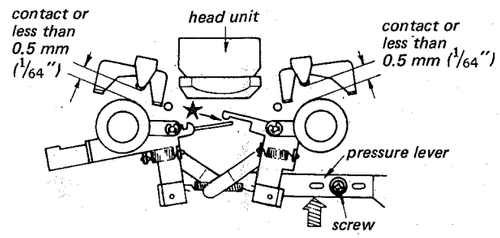


When the actuator rod is pushed in the direction shown by arrow, make sure that the shut-off switch is turned on at the position shown. If necessary, loosen the screw and adjust the actuator bracket ass'y (located under the chassis) position.

Pinch Roller Timing Adjustment
– Stop Mode –

Slowly and carefully push the pressure lever in the direction shown by the arrow. Make sure that either of the following functions is satisfied.

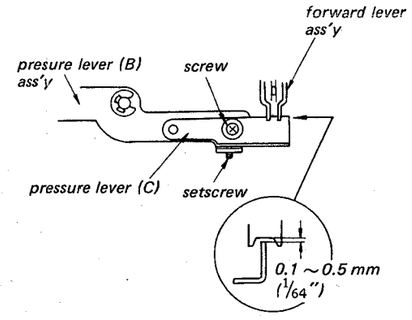
1. Both pinch rollers simultaneously contact the capstans.
2. When one pinch roller contacts the capstan, the other is positioned at less than 0.5 mm (1/64") from the capstan.



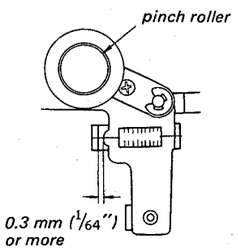
If necessary, loosen the screw and adjust the pressure lever position. After the adjustment, make sure of the clearance shown by mark ★.

Pinch Roller Pressure Lever Adjustment

1. Stop Mode
   Loosen the screw and adjust the setscrew.

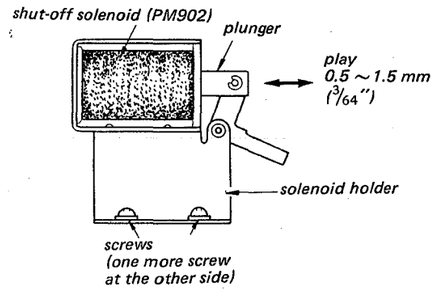


2. Playback Mode
   Make sure of the clearance shown below for both right and left pinch rollers.



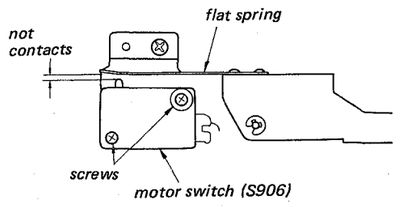
3-2-2.

Shut-off Solenoid (PM902) Adjustment
– Forward Playback Mode –



Loosen the screws and adjust the solenoid holder position for the specified play of plunger.

Motor Switch (S906) Adjustment



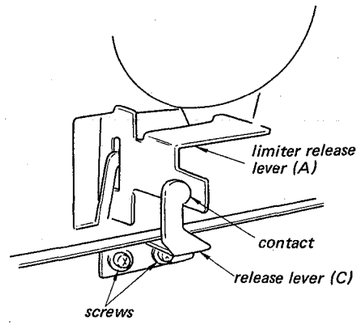
Make sure of the following:

Mode	Motor Switch
Stop	as shown
Forward and Reverse playbacks Fast forward Rewind	turned ON

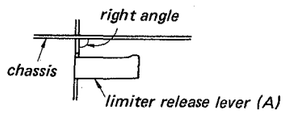
If necessary, loosen the screws and adjust the switch position.

Clutch Release Lever Adjustment
– Rewind and Fast Forward Modes –

Note: This adjustment should be performed after the tension arm adjustment on page 11.



Loosen the screws and adjust the release lever (C) position for the condition shown below:

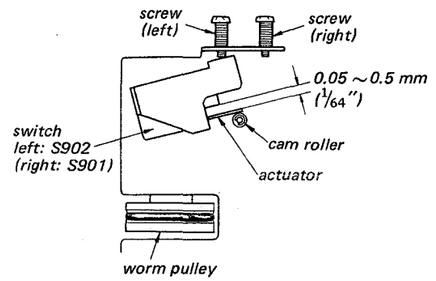


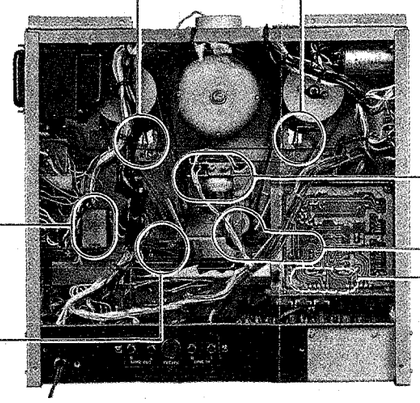
Adjust the other side release lever in the same way.

Head Rotation Detector Switch (S901 and S902) Adjustment
– Stop Mode –

Turn the worm pulley by hand and adjust the screws for the clearance shown.

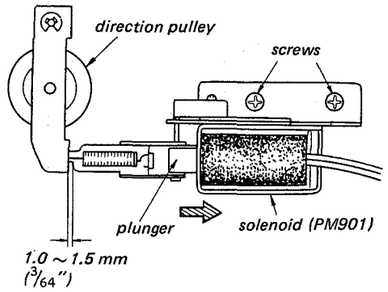
Cam roller position	Adjust	Switch adjusted
fully right	screw (right)	S901
fully left	screw (left)	S902





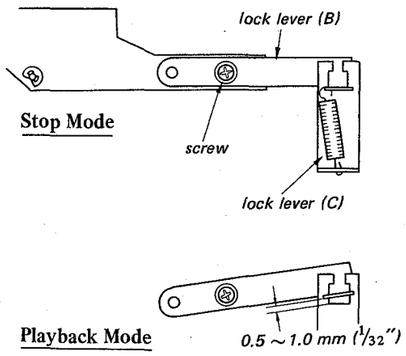
Head Rotation Solenoid (PM901) Adjustment
– Stop Mode –

When pushing the plunger into the solenoid to the end, make sure of the clearance shown.



If necessary, loosen the screws and adjust the solenoid position.

Record Lock Lever Adjustment



Make sure of the clearance shown above in playback mode. If necessary, loosen the screw and adjust the lock lever (B) position in stop mode.

3-2-3.

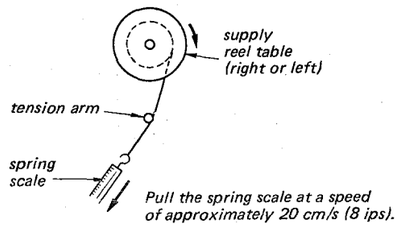
Back Tension Adjustment

This adjustment should be performed after the tension arm adjustment on page 11.

Measurement

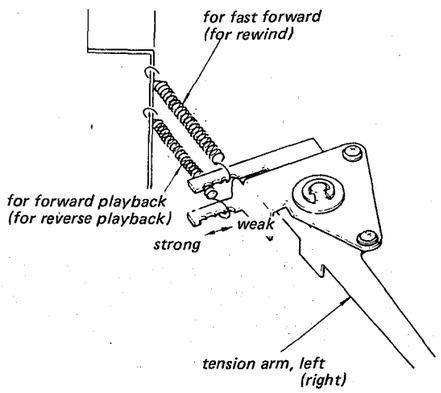
Specified values:

Mode	Back Tension Torque
forward playback reverse playback	50 ~ 60 g·cm (0.7 ~ 0.8 oz·inch)
rewind fast forward	10 ~ 15 g·cm (0.14 ~ 0.20 oz·inch)



Note: Thread the tape on the tension arm only.

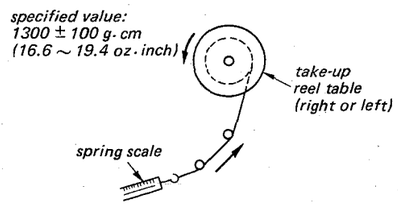
Adjustment



Adjust by changing hook position of the springs.

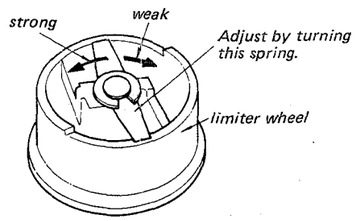
Rewind and Fast Forward Torque Adjustment
– Rewind and Fast Forward Modes –

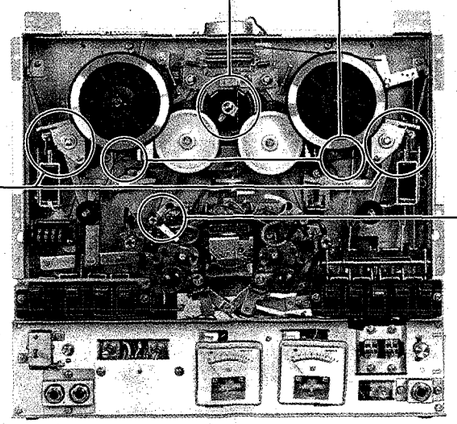
Measurement



Measure the torque while the reel takes up the tape at a speed of approximately 20 cm/s (8 ips).

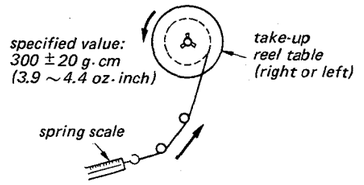
Adjustment





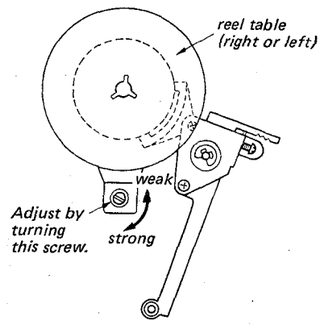
Take-up Torque Adjustment
– Forward and Reverse Playback Modes –

Measurement

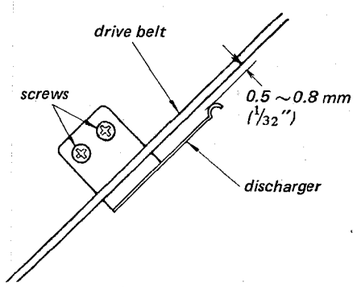


Measure the torque while the reel takes up the tape at a speed of approximately 10 cm/s (4 ips).

Adjustment



Discharger Positioning
– Playback Mode –

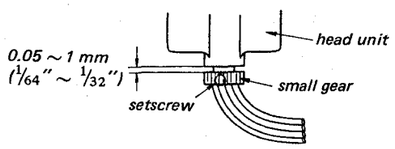


Loosen the screws and adjust the discharger position.

3-2-4.

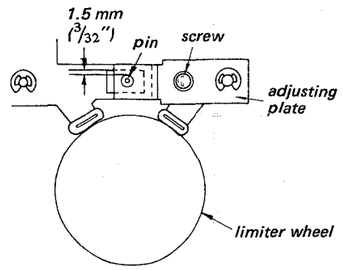
Small Gear (for head rotation) Adjustment
– Forward Playback Mode –

Loosen the setscrew and adjust the clearance shown.



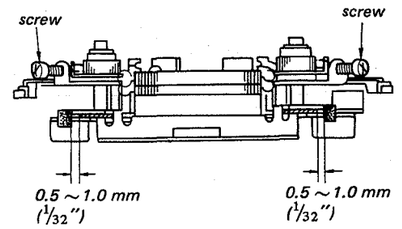
Limiter Brake Adjustment
– Stop Mode –

Loosen the screw and adjust the adjusting plate position.



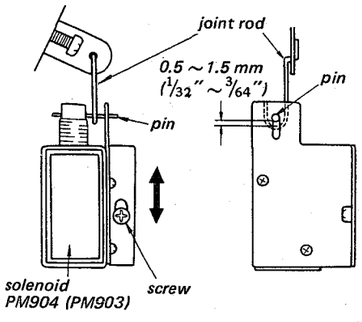
Reel Table Brake Adjustment
– Stop Mode –

Adjust the screws for the clearance shown.

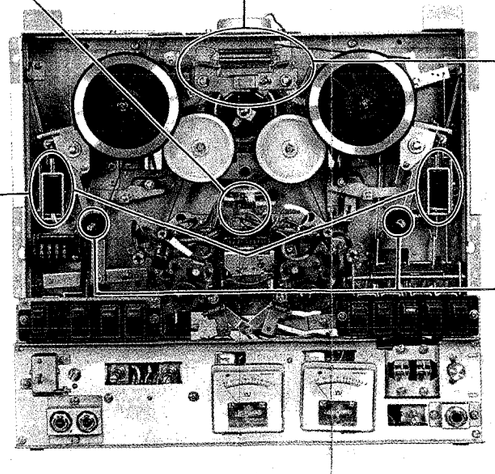


After the adjustment, make sure that the brakes release with a clearance of more than 1 mm (3/64") between the brake linings and the reel tables in forward playback, reverse playback, rewind and fast forward modes.

Tension Regulator Release Solenoid (PM903, PM904) Adjustment
– Stop Mode –

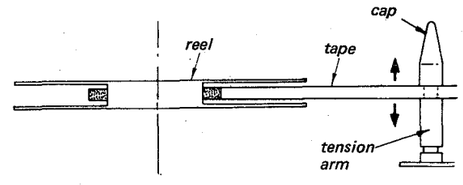


Loosen the screw and adjust the solenoid position for the clearance shown.



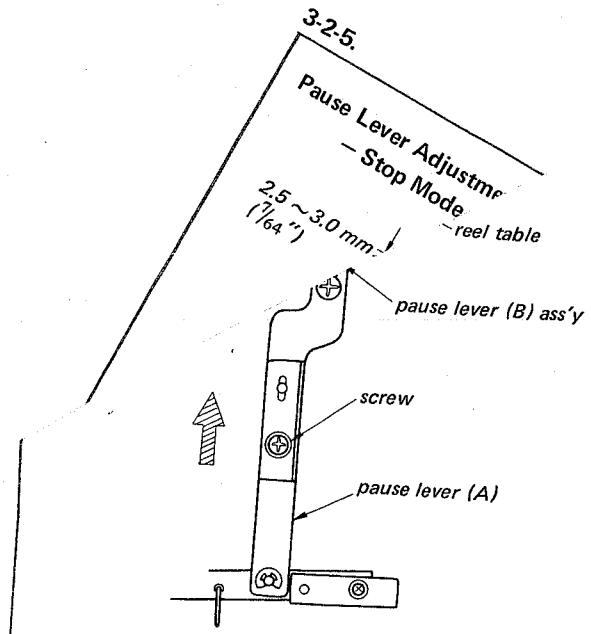
Tension Arm Cap Adjustment
– Forward and Reverse Playback Modes –

Turn the cap and adjust the tape height so that the reel takes up the tape without tape contact to the reel flanges.



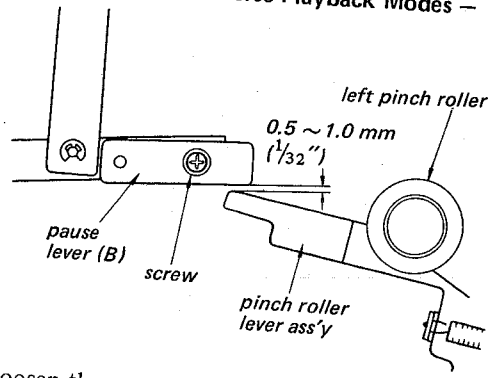
Note: Do not use a deformed reel.

3-2-5. Pause Lever Adjustment – Stop Mode –



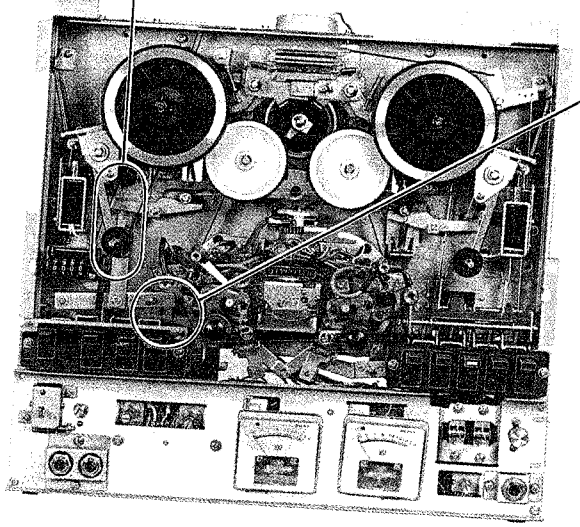
Loosen the screw and adjust the pause lever (B) ass'y position for the clearance shown.

Lever Adjustment (2) Forward and Reverse Playback Modes –



1. Loosen the screw and adjust pause lever (B) position for the clearance shown.
2. With PAUSE lever depressed, make sure that the pinch roller separates from the capstan more than 0.5 mm and that the pause brake operates.

   Note: Even if PAUSE lever is slowly depressed, the tape should not be slacked.



3. PAUSE knob should be locked with first depression and be released with second depression.
4. When either the forward knob, the reverse knob, the fast forward knob or the rewind knob is depressed, other knob cannot be depressed without releasing it by depressing the stop knob.

Tape Transport Operation Checks:

1. In automatic reverse operation or in function knob depression, the shut-off mechanism should not be operated by tape slack.
2. In fast forward mode and rewind mode, tape should not contacts the record head and the playback head.
3. Near the end of tape, tape transport should start smoothly with fast forward knob or rewind knob depressed.

3-2-6. CHECKS AFTER MECHANICAL ADJUSTMENTS

Function Knob Operation Checks:

1. With no tape threaded (shut-off switch: OFF), each function knob should not be locked.
2. REC knob should not be individually locked.

Wow and Flutter Measurement:

Play back the SONY Test Tape WS-19-7 and measure wow and flutter with a wow meter in vertical and horizontal operations.

Standard values: 0.15 % RMS at 19 cm/s (7½ ips)
0.2 % RMS at 9.5 cm/s (3¾ ips)

C-458

3-2-7. TAPE PATH ADJUSTMENT

Note:

(1) These adjustments should be made by referring to the well-adjusted rotary ferrite head unit. When the rotary ferrite head have been misadjusted or removed, replace the rotary ferrite head unit assembly (Part No.: X-35350-10-0).

(2) A nut driver (hexagon socket, 4 mm nut) is required. Grind down a nut driver with a grinder as shown.

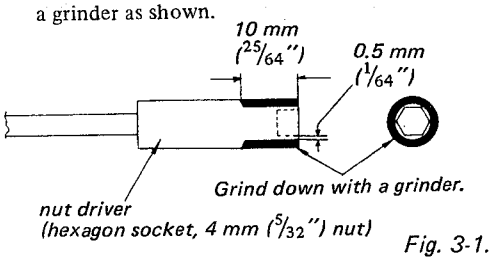


Fig. 3-1.

(3) Use a 1.5 mm allen wrench for tape guide Ⓒ adjustment.

(4) Use the SONY R-7ES reel and the SUPER 150 tape or equivalent.

(5) After adjustments, perform the rotary ferrite head unit adjustments.

(6) Before adjustments, make sure that the tension arm cap adjustment has been made.

(7) Perform the adjustments step by step.

Proce

1. Proceed
   parallel wi
   1) Set the u
      Adjust the ta
      even height of th path in
      playback head cores.
   2) When a curl appears on mode.
      adjust the tape guides Ⓑ in the
      visionally to eliminate the cu
      (See curl elimination.)
   3) As the tape path is affected by the
      adjustment at step 2), repeat steps 1
      a few times.

2. Proceed as follows to align the center line of the tape path and the center of rotary shaft of the head.
   1) Set the unit to the forward playback mode. Turn the tape guides Ⓐ and ⓐ counterclockwise by 12 degrees. Thus the upper edge of the tape is 0.025 mm (1 mil) higher than that of the head core. After adjustment, the tape guides Ⓐ and ⓐ should not move at all.
   2) When the curl appears on the tape from ① to ⑥, adjust the tape guides Ⓑ, Ⓒ, ⓑ and ⓒ provisionally to eliminate curl.
      (See 3. Curl Elimination.)

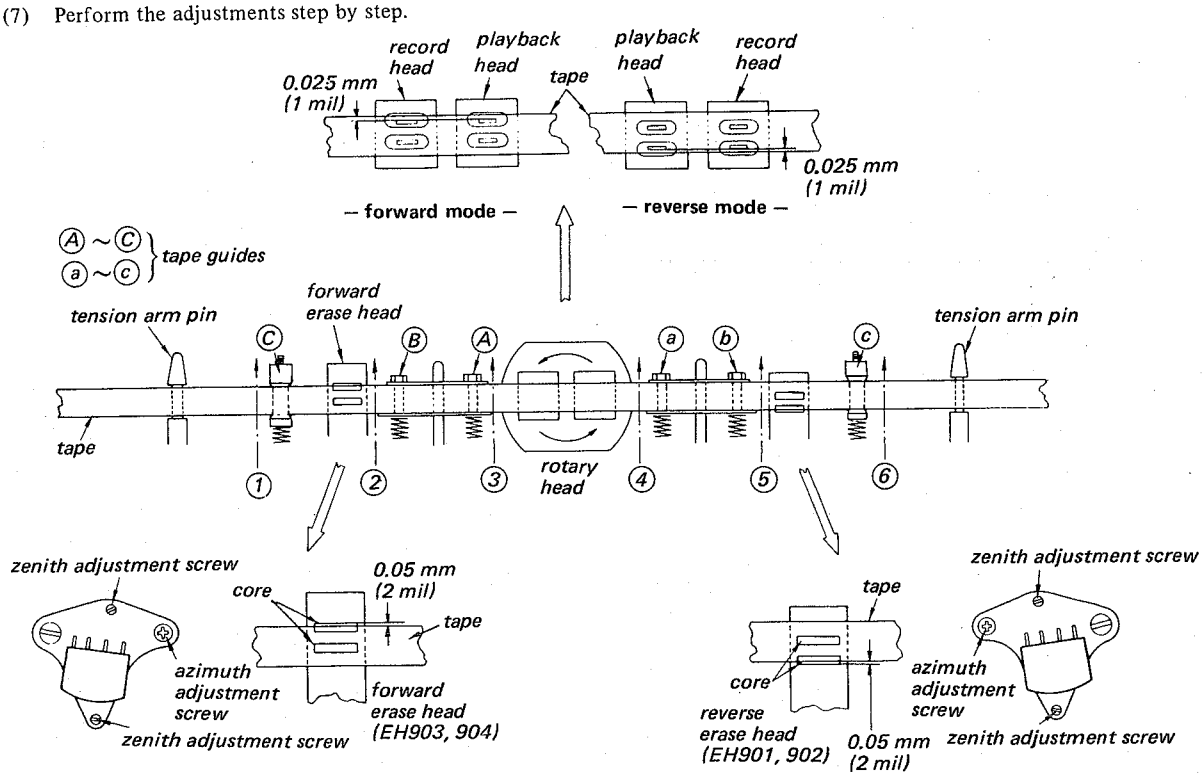


Fig. 3-2.

3. Curl Elimination
Curl appears as shown in Fig. 3-3 when the even height cannot be obtained between the tape guides. To eliminate curl, proceed as follows:

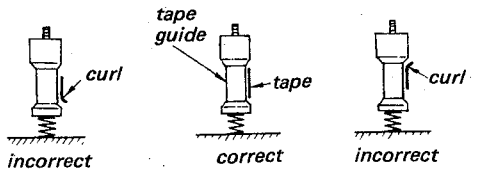


Fig. 3-3. Curl elimination

Curl between ① and ③ should be eliminated in the forward playback mode and that between ④ and ⑥ in the reverse playback mode.

- Curl Elimination between ① and ③ (in the forward playback mode):
  1) When the curl appears at part ① , adjust the tape guide Ⓒ .
  2) When curl appears at part ② caused by the step 1), adjust the tape guide Ⓑ .
  3) When curl appears at part ③ caused by the step 2), adjust the tape guide Ⓐ .
  4) When curl appears at part ② caused by the step 3), adjust the tape guide Ⓒ .

- Curl Elimination between ④ and ⑥ (in the Reverse playback mode):
  1) When curl appears at part ⑥ , adjust the tape guide ⓒ .
  2) When curl appears at part ⑤ caused by the step 1), adjust the tape guide ⓑ .
  3) When curl appears at part ④ caused by the step 2), adjust the tape guide ⓐ .
  4) When curl appears at part ⑤ caused by the step 3), adjust the tape guide ⓒ .

4. Erase Head Position Adjustment
After the adjustments from 1 to 3, adjust the erase head position as follows:
The forward erase head position adjustment should be made in the forward playback mode, and reverse erase head position adjustment should be made in the reverse playback mode.

Procedure:

Adjustment of Forward Erase Head (in the forward playback mode):

1) Adjust the two zenith adjustment screws, to obtain even contact between tape and head. See Fig. 3-4.

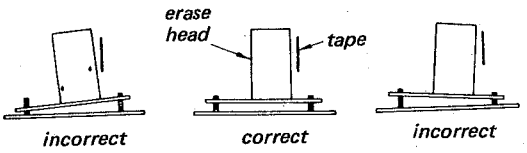


Fig. 3-4. Erase head zenith adjustment

2) Turn the zenith adjustment screws in the same direction and same amount, to align the upper edge of the erase head core with the tape. Then turn the zenith adjustment screws counter-clockwise by 40 degrees. Thus upper edge of the head core becomes 0.05 mm (2 mil) higher than that of the tape. (See Fig. 3-2.)
3) Adjust the azimuth adjustment screw to set the erase head core in parallel with the upper edge of the tape.

Adjustment for Reverse Erase Head (in the reverse playback mode):

1) Adjust the zenith adjustment screws to obtain the even contact between the tape and the head as shown in Fig. 3-4.
2) Turn the zenith adjustment screws in the same direction and same amount, to align the lower edge of the erase head core with the tape. Then turn the zenith adjustment screws clockwise by 40 degrees. Thus the lower edge of the head core becomes 0.05 mm (2 mil) lower than that of the tape. (See Fig. 3-2.)
3) Adjust the azimuth adjustment screw to set the erase head core in parallel with the lower edge of the tape.

3-2-8. Head Replacement in the Rotary Ferrite Head Unit Ass'y

Perform one of the following three methods with a care, as rotary heads are precisely assembled.

1. Damaged record head and normal playback head: Replace only the record head. (Playback head should not be moved.)

2. Normal record head and damaged playback head: Replace only the playback head. (Record head should not be moved.)

3. Defective record and playback heads. Replace the rotary ferrite head unit ass'y. When a head or the rotary ferrite head unit ass'y is replaced, an adjustment should be made successively. The necessary adjustment is shown on pages 23 to 28.

3-3. ELECTRICAL ADJUSTMENTS AND MEASUREMENTS

PRECAUTION

1. Clean the following parts with an alcohol moistened swab:
   * record and playback heads
   * erase heads
   * capstans
   * pinch rollers.
   * rubber belts
   * idlers
2. Demagnetize record and playback heads with a head demagnetizer.
3. Do not use magnetized screwdriver for adjustments.
4. After adjustments, apply a small amount of locking compound to the parts adjusted.
5. Adjustments should be performed in the order arranged in this service manual.
6. Adjustments and measurements should be performed for both L-CH and R-CH with rated power supply voltage unless otherwise specified.
7. Record and playback level adjustments should be carefully performed.

Test Equipment/Tools Required:

audio oscillator (af osc)
VTVM
digital frequency counter
oscilloscope
400 Hz bandpass filter
attenuator (600 Ω)
non-magnetic screwdriver
resistors . . . . . 600 Ω (¼ W), 10 kΩ (¼ W), 100 kΩ (¼ W)
blank tapes (completely erased with bulk eraser)
SONY SUPER 150
SONY SLH
SONY test tapes

J-19-F2

Tone	1st	2nd	3rd	4th	5th	6th	7th
Frequency (Hz)	400	400	10 k	12.5 k	7 k	80	40
Level (dB)	0	−10	−10	−10	−10	−10	−10

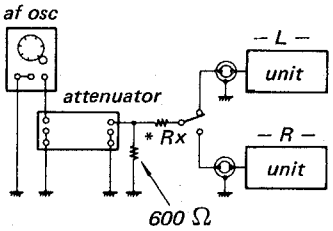
J-19-A2 (12.5 kHz, −10 dB)
SPC-47 (4 kHz, 0 dB)
reel SONY R-7ES (180 mm, 7 inches)

TAPE SELECT and TAPE SPEED switches and LINE OUT VOL control should be set as follows unless otherwise specified.

TAPE SELECT: NORMAL
TAPE SPEED: 19
LINE OUT VOL: MAX

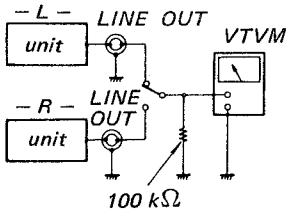
Connections:

INPUT



* *Rx*
MIC . . . . short-circuited
LINE IN. . 10 kΩ

OUTPUT



Standard Levels:

Deliver the specified input signal level to the MIC jack unless otherwise indicated. Set the REC VOL controls for the specified output signal level.

Standard Input Level

	MIC	LINE IN
source impedance	300 Ω	10 kΩ
input level	−60 dB (0.77 mV)	−10 dB (0.25 V)

Standard Output Level

	LINE OUT
load impedance	100 kΩ
output level	0 dB (0.775 V)

Note on head base unit ass'y HBU-315:

When the head base unit ass'y is replaced, perform "3. Curl Elimination" on page 21 and proceed to the electrical adjustment starting from "3-2. Playback Head Azimuth Adjustment" on page 27.

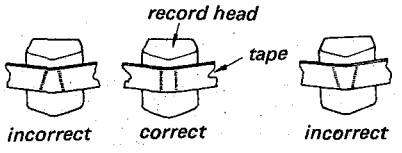
1. Record Head Adjustment After Record Head Replacement

1-1. Zenith Adjustment

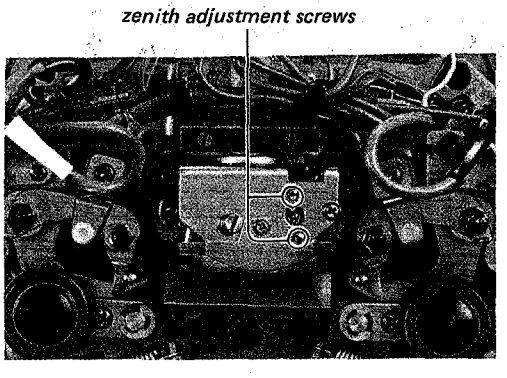
Procedure:

Mode: reverse playback

Adjust the two zenith adjustment screws so that the head contacts with the tape correctly.



Adjustment Location:

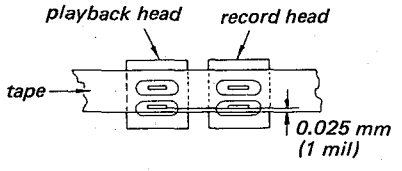


1-2. Height Adjustment

Procedure:

Mode: reverse playback

Turn the zenith adjustment screws in the same direction and equal amounts to align the bottom of the head core with the lower edge of the tape. Next turn them counterclockwise by about 12 degrees. Thus the bottom edge of the head core becomes 0.025 mm (1 mil) higher than the lower edge of the tape.



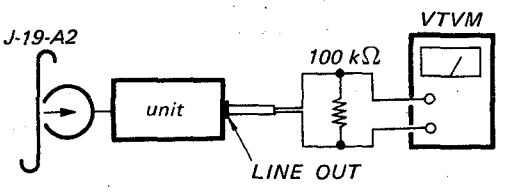
1-3. Playback Head Azimuth Adjustment

Settings:

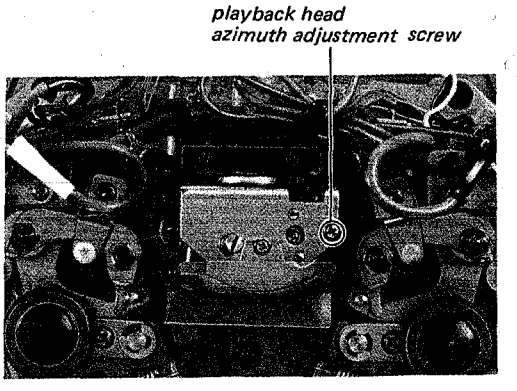
MONITOR switch: TAPE

Procedure:

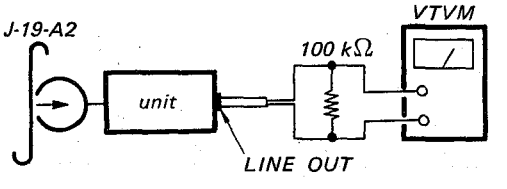
1) Mode: forward playback



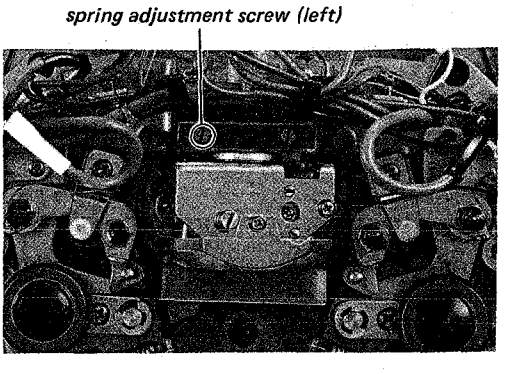
Adjust the azimuth adjustment screw for maximum VTVM reading



2) Mode: reverse playback



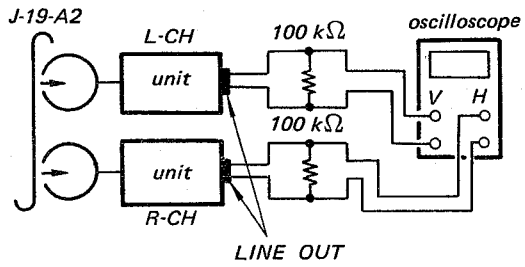
Carefully adjust the spring adjustment screw (left) for maximum VTVM reading.



Continued on next page.

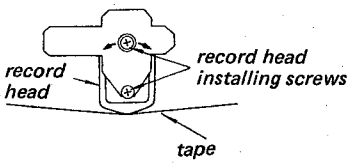
Continued from page 23.

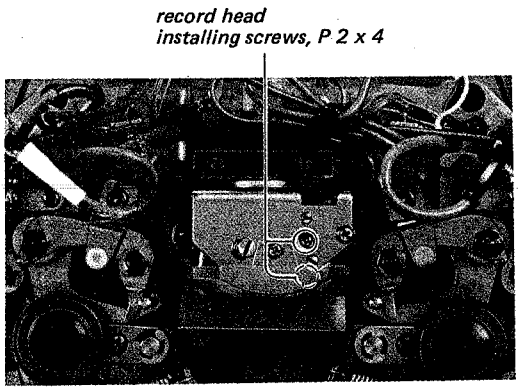
3) Mode: forward and reverse playbacks



4)

Adjust	Oscilloscope patterns
azimuth adjustment screw to obtain the in-phase pattern	[Allowance] in-phase ~ 90° out of phase (L) (R) (L) (R)





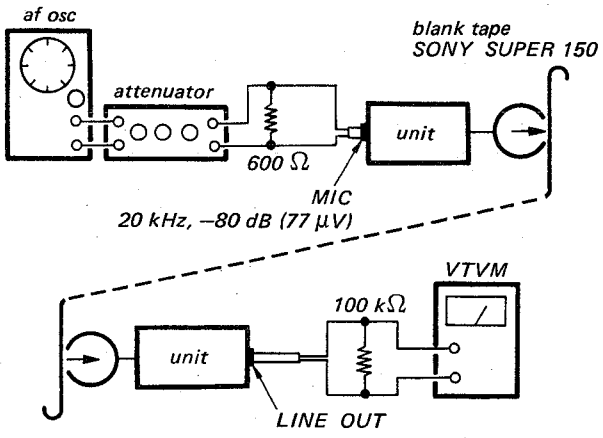
1-4. Tape Contact Adjustment of Record Head

Settings:

MONITOR switch: TAPE

Procedure:

1) Mode: reverse record and simultaneous playback



2) Loosen record head installing screws and adjust record head position by moving the head in the direction shown by the arrows to obtain the maximum VTVM reading.

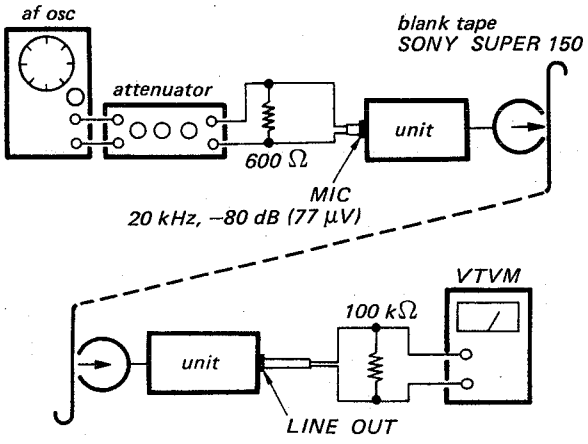
1-5. Record Head Azimuth Adjustment

Settings:

MONITOR switch: TAPE

Procedure:

1) Mode: reverse record and simultaneous playback



2) Carefully adjust record head azimuth adjustment screw for maximum VTVM reading.

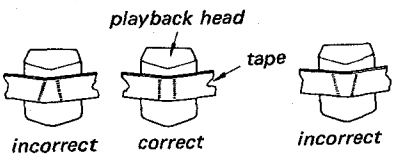
2. Playback Head Adjustment After Playback Head Replacement

2-1. Zenith Adjustment

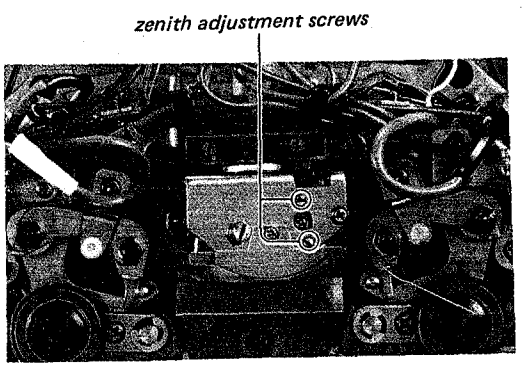
Procedure:

Mode: forward playback

Adjust the two zenith adjustment screws so that the head contacts with the tape correctly.



Adjustment Location:

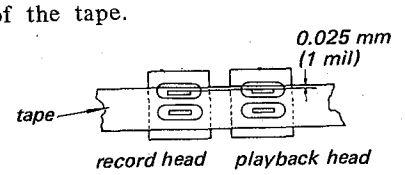


2-2. Height Adjustment

Procedure:

Mode: forward playback

Turn the zenith adjustment screws of the playback head in the same direction and equal amounts to align the top core of the playback head is even with the upper edge of the tape.
Next turn them counterclockwise by about 12 degrees. Thus the top edge of the head core is 0.025 mm (1 mil) lower than the upper edge of the tape.



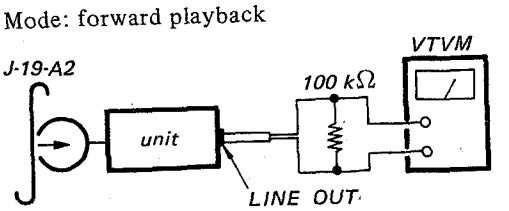
2-3. Tape Contact Adjustment of Playback Head

Settings:

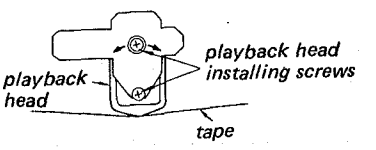
MONITOR switch: TAPE

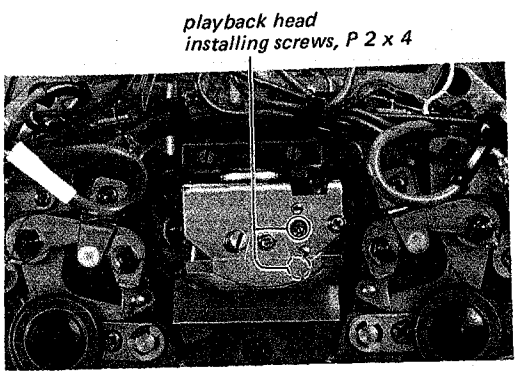
Procedure:

1) Mode: forward playback



2) Loosen playback head installing screws and adjust playback head position by moving the head in the direction shown by the arrows to obtain the maximum VTVM reading.





Continued on next page.

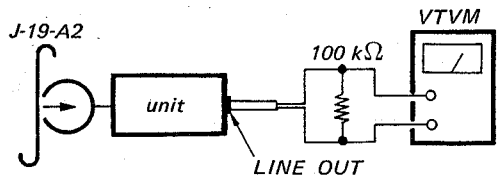
2-4. Playback Head Azimuth Adjustment

Settings:

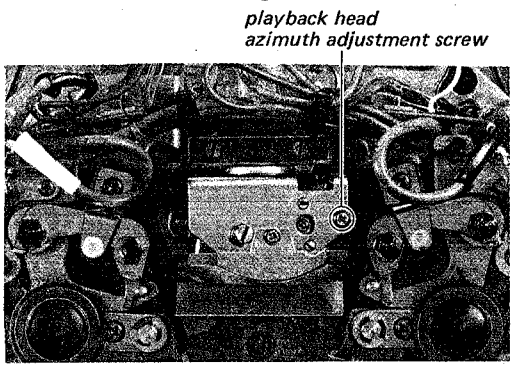
MONITOR switch: TAPE

Procedure:

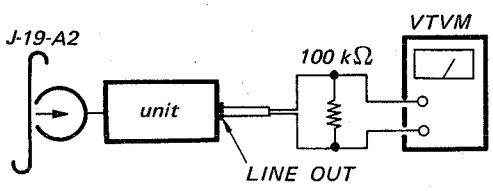
1) Mode: forward playback



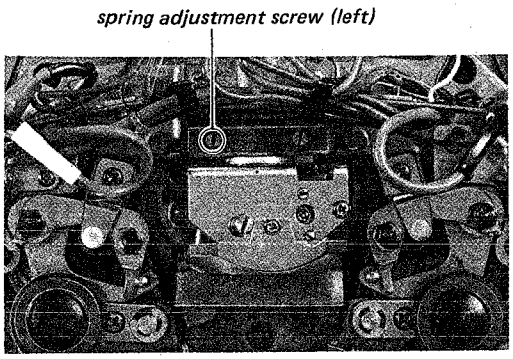
Carefully adjust the azimuth adjustment screw for maximum VTVM reading.



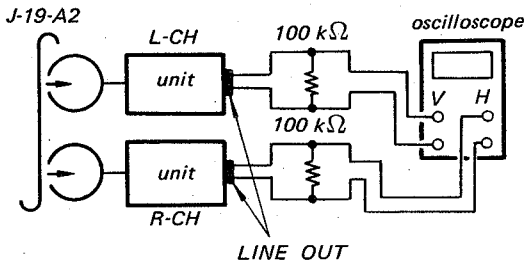
2) Mode: reverse playback



Carefully adjust the spring adjustment screw (left) for maximum VTVM reading.



3) Mode: forward and reverse playbacks



4)

Adjust	Oscilloscope patterns
azimuth adjustment screw to obtain the in-phase pattern	[Allowance] in-phase ~ 90° out of phase (L) (R) (L) (R)

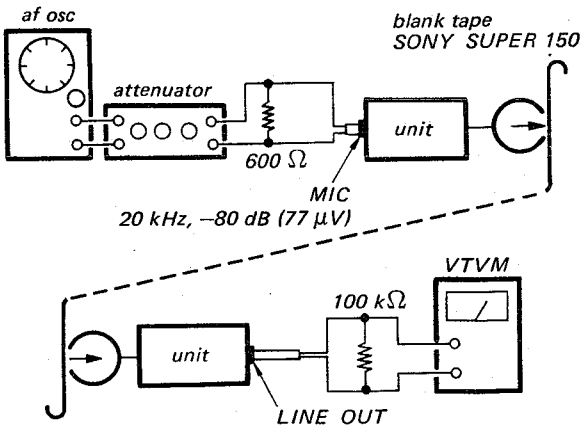
2-5. Record Head Azimuth Adjustment

Settings:

MONITOR switch: TAPE

Procedure:

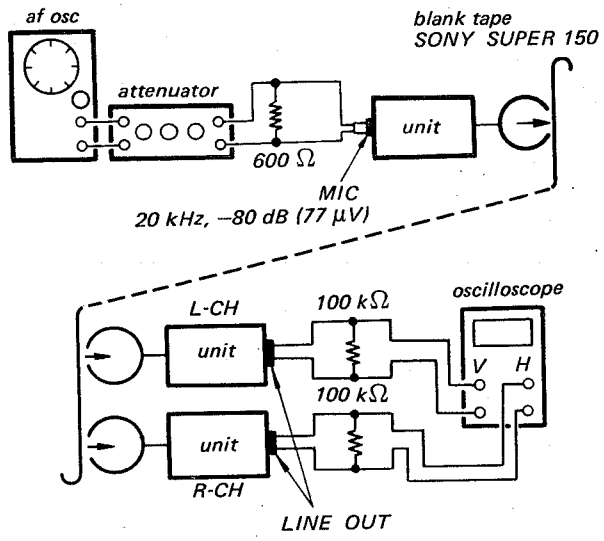
1) Mode: reverse record and simultaneous playback



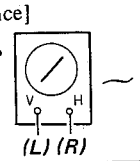
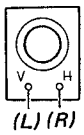
2) Carefully adjust the record head azimuth adjustment screw for maximum VTVM reading.

Continued on next page.

3) Mode: reverse record and simultaneous playback



4)

Adjust	Oscilloscope patterns
azimuth adjustment screw to obtain the in-phase pattern	[Allowance] in-phase  90° out of phase  (L) (R) (L) (R)

3. Rotary Ferrite Head Unit Ass'y Adjustment

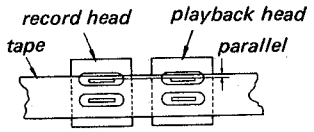
Note:
Perform all this adjustment when the rotary ferrite head unit ass'y, X-35350-10-0, is replaced. Perform the adjustments from 3-2 when the head base unit ass'y HBU-315 is replaced.

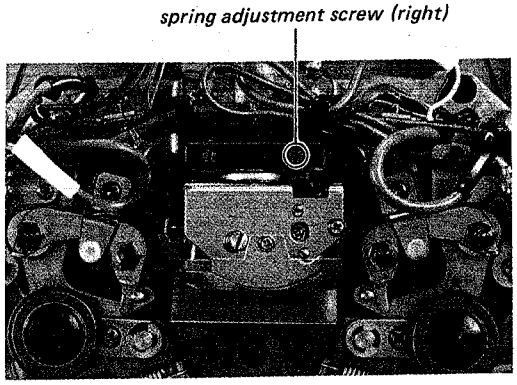
3-1. Head Height Adjustment

Procedure:

Mode: forward playback

Carefully adjust the spring adjustment screw (right) to align the record head and playback head, and the upper edge of the tape.





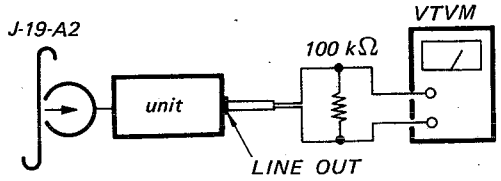
3-2. Playback Head Azimuth Adjustment

Settings:

MONITOR switch: TAPE

Procedure:

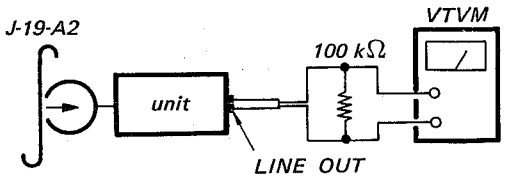
1) Mode: forward playback



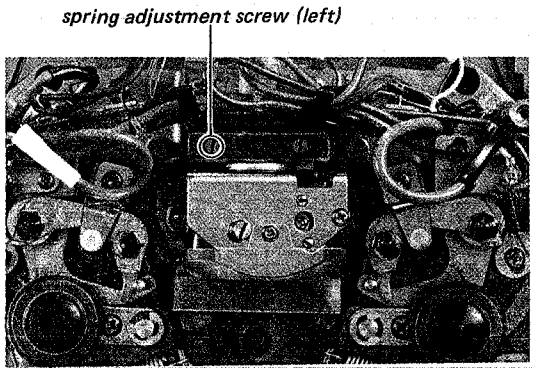
2) Carefully adjust the azimuth adjustment screw for maximum VTVM reading.

Continued on next page.

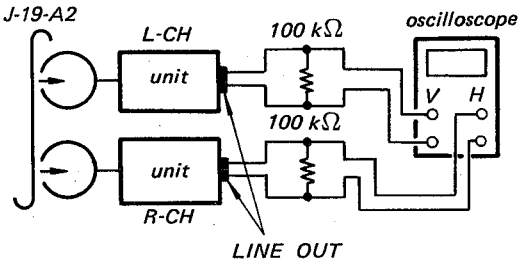
3) Mode: reverse playback



Carefully adjust the spring adjustment screw (left) for maximum VTVM reading.



4) Mode: forward playback



Adjust	Oscilloscope patterns
azimuth adjustment screw to obtain the in-phase pattern	[Allowance] in-phase (L) (R) ~ 90° out of phase (L) (R)

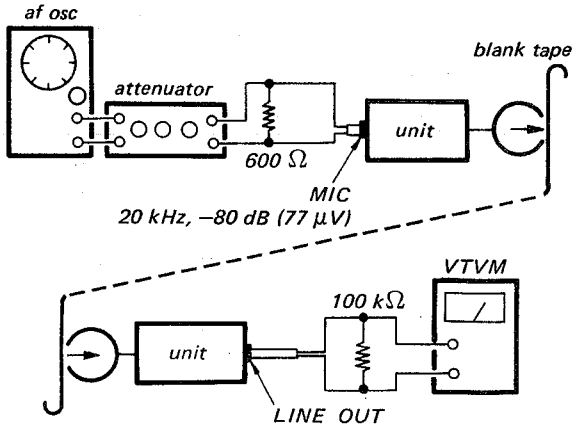
3-3. Record Head Azimuth Adjustment

Settings:

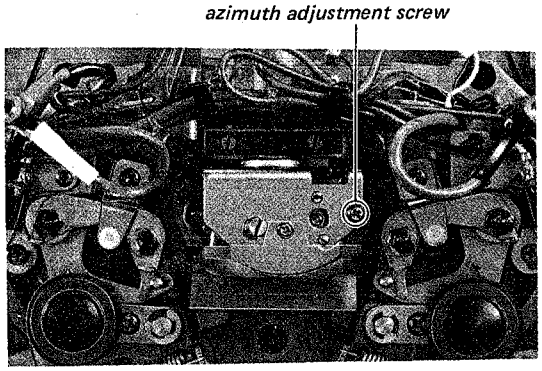
MONITOR switch: TAPE

Procedure:

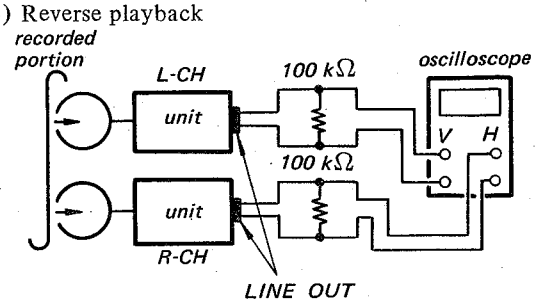
1) Mode: reverse record and simultaneous playback



2) Carefully adjust the record head azimuth adjustment screw for maximum VTVM reading.



3) Reverse playback



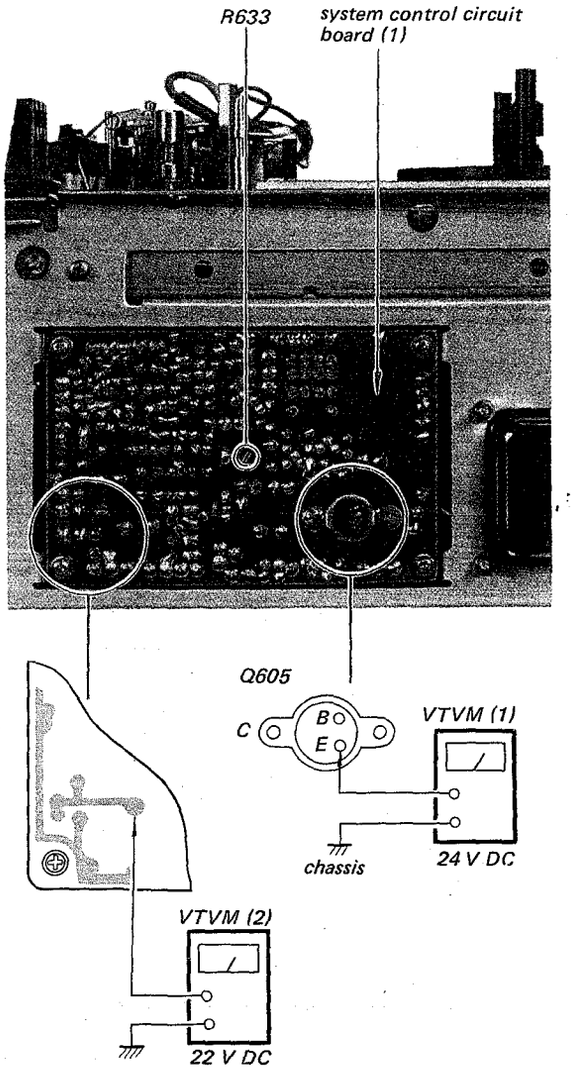
Adjust	On the oscilloscope
azimuth adjustment screw	[Allowance] in-phase (L) (R) ~ 90° out of phase (L) (R)

4. B+ Calibration

Settings:

POWER switch: ON

Procedure:



Adjust R633 for 24 V DC VTVM (1) indication at the emitter of Q605.
Check for 22 V DC VTVM (2) indication at the pattern shown.

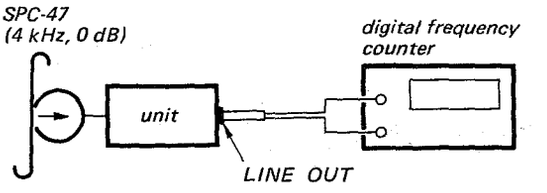
5. Tape Speed Adjustment

Settings:

MONITOR switch: TAPE

Procedure:

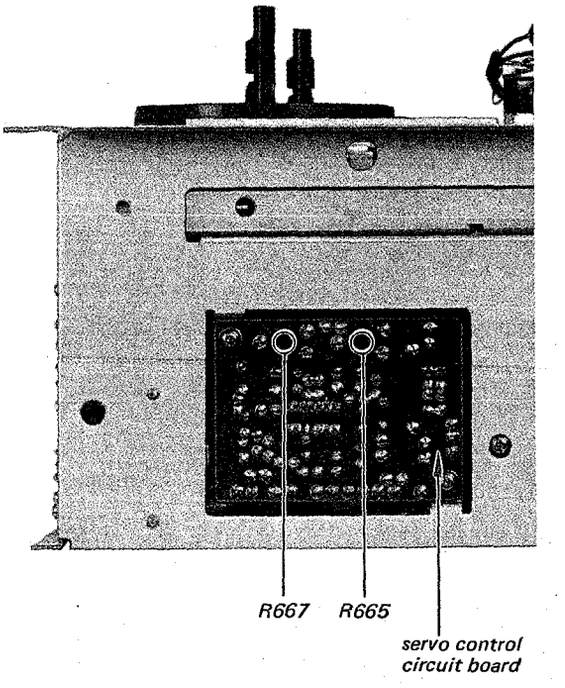
1. Mode: forward playback



2.

TAPE SPEED switch	Adjust	Digital Frequency Counter Reading
19	R667	4,000 Hz ± 40 Hz
9.5	R665	2,000 Hz ± 30 Hz

Adjustment Locations:



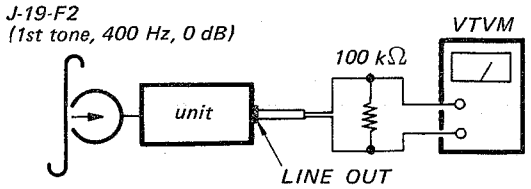
6. Playback Level Adjustment

Settings:

MONITOR switch: TAPE

Procedure:

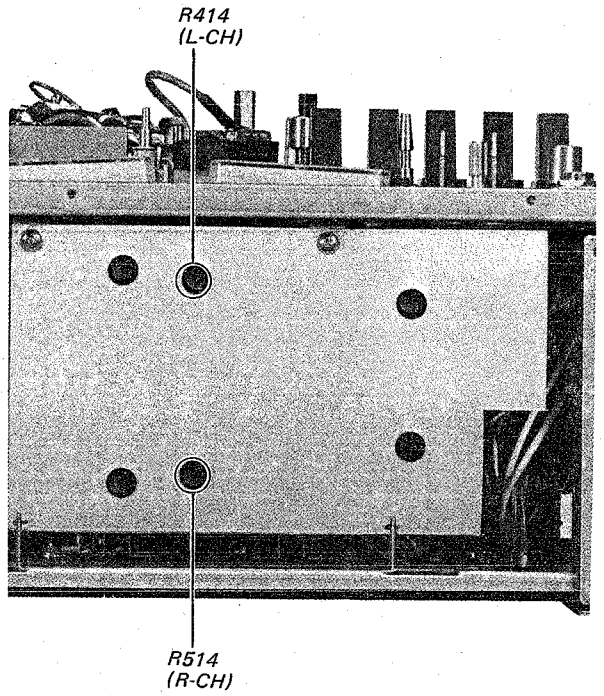
1. Mode: forward playback



2.

TAPE SELECT switch	Adjust	VTVM reading	Remarks
NORMAL	R414 (L-CH) R514 (R-CH)	0 dB (0.775 V)	1. Allowance: within ± 1 dB 2. Level difference between the L-CH and R-CH should be within 1 dB
SPECIAL	As set in above step.	−2.5 dB (0.59 V)	Allowance: +0.5 dB, −0 dB

Adjustment Locations:



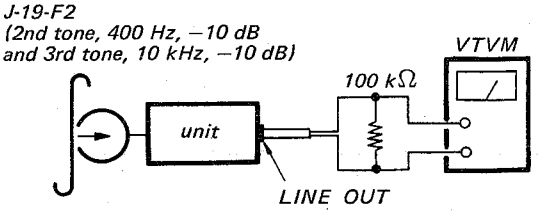
7. Playback Equalizer Adjustment

Settings:

MONITOR switch: TAPE

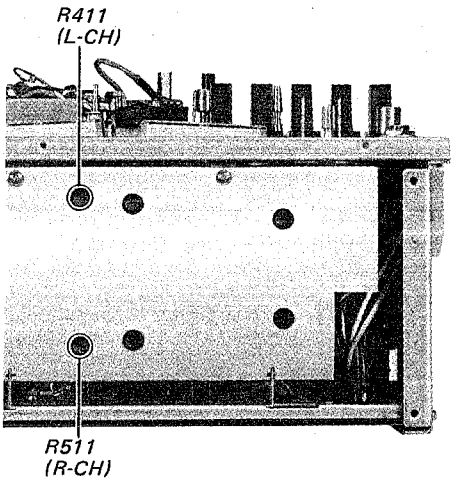
Procedure:

1. Mode: forward playback

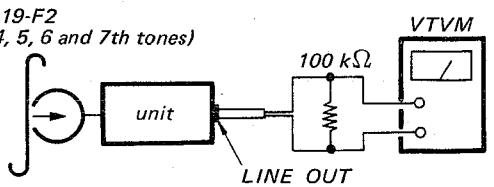


2. Adjust R411 and R511 for the same VTVM reading. Level allowance between 2nd and 3rd tones: ± 2 dB

Adjustment Locations:



3. Mode: forward playback



Tone	Level difference from 2nd tone
4th (12.5 kHz, −10 dB)	0 ± 2 dB
5th (7 kHz, −10 dB)	0 ± 2 dB
6th (80 Hz, −10 dB)	+ 1 ± 2 dB
7th (40 Hz, −10 dB)	+ 1 ± 2 dB

When the specified values are not obtained, perform playback head azimuth adjustment.

4. Level difference between forward playback and reverse playback: less than 1 dB

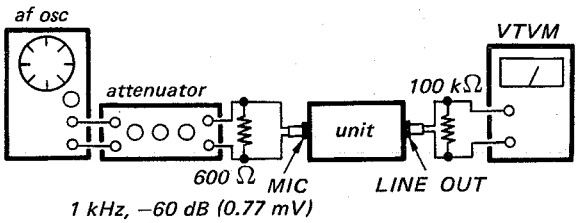
8. VU Meter Calibration

Settings:

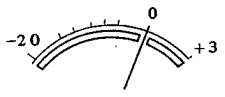
MONITOR switch: SOURCE

Procedure:

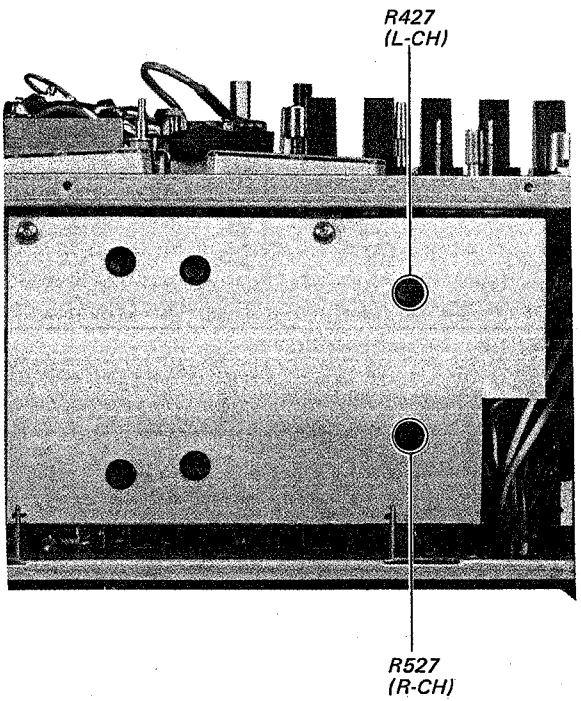
1. Mode: forward record



2.

Adjust	VU meter reading: 0 VU
R427 (L-CH) R527 (R-CH)	

Adjustment Locations:



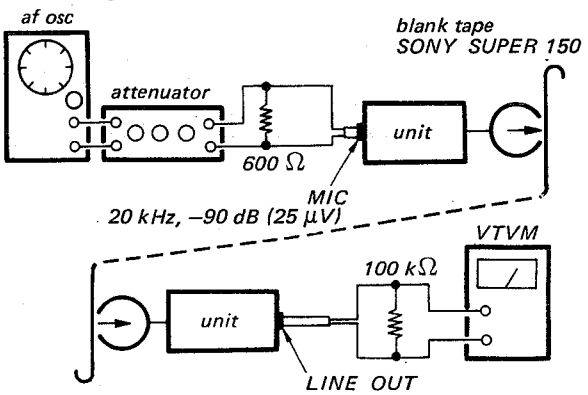
9. Erase Head Dummy Coil Adjustment (forward erase)

Settings:

MONITOR switch: TAPE

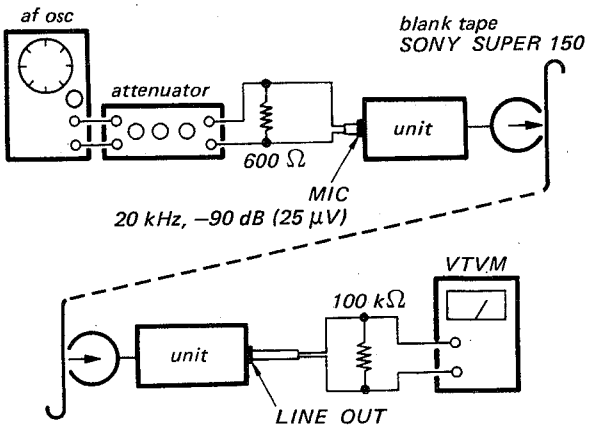
Procedure:

1. Mode: forward stereo record and simultaneous playback



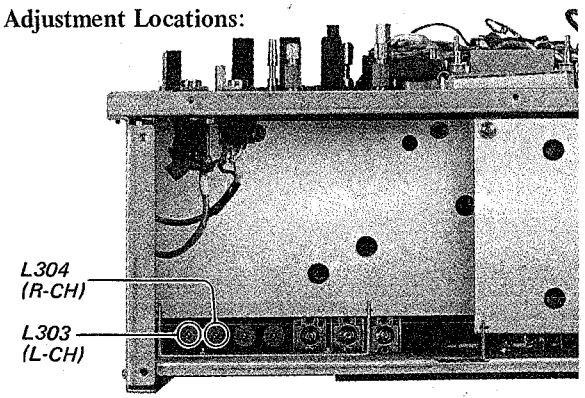
Note VTVM readings of both L-CH and R-CH outputs.

2. Mode: forward monaural record and simultaneous playback



3. Adjust L303 (L-CH) and L304 (R-CH) so that output level of each channel becomes equal to those obtained in step 2. Level difference from stereo record: ± 2 dB

Adjustment Locations:



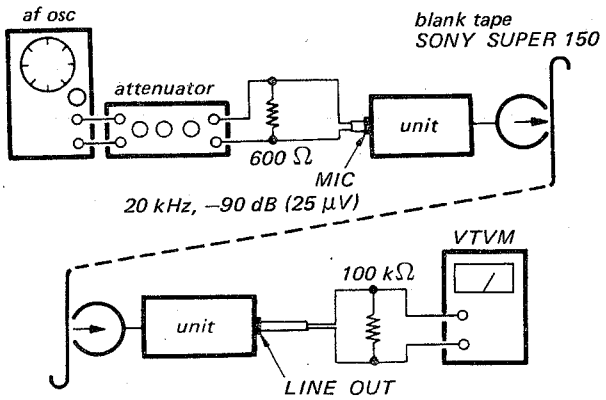
10. Erase Head Dummy Coil Adjustment (reverse erase)

Settings:

MONITOR switch: TAPE

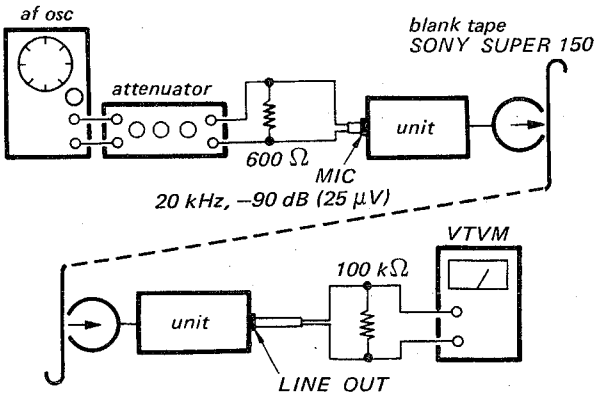
Procedure:

1. Mode: reverse stereo record and simultaneous playback



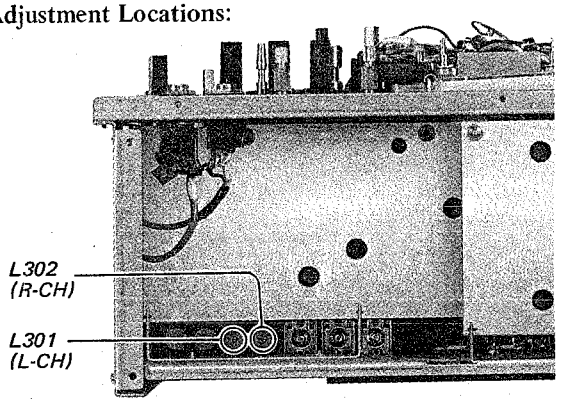
Note VTVM readings of both L-CH and R-CH outputs.

2. Mode: reverse monaural record and simultaneous playback



3. Adjust L301 (L-CH) and L302 (R-CH) so that output level of each channel becomes equal to those obtained in step 2. Level difference from stereo record: ± 2 dB

Adjustment Locations:



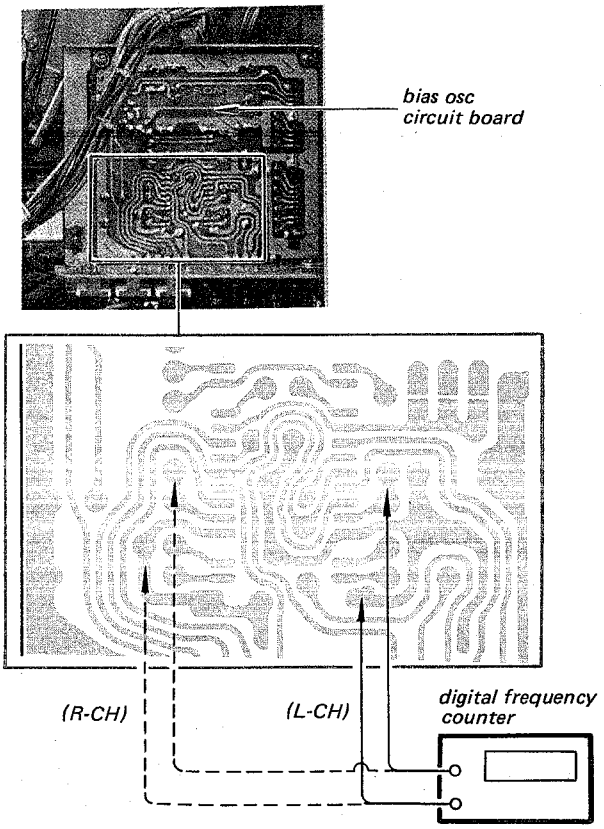
11. Record Bias Frequency Adjustment

Settings:

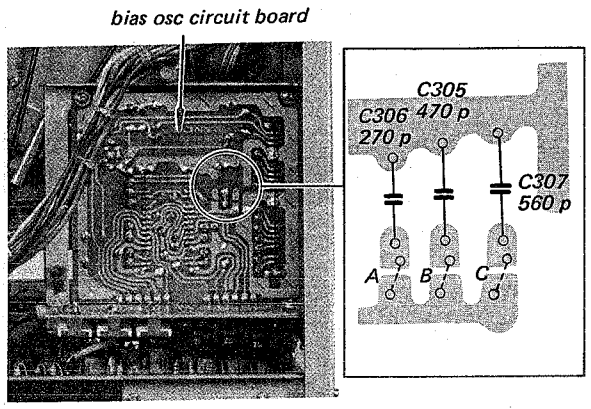
MONITOR switch: TAPE

Procedure:

1. Mode: forward stereo record

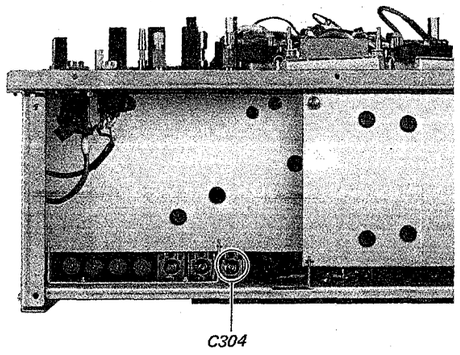


2. Adjust forward record bias frequency adjustment capacitance value by connecting patterns as shown with the dotted lines A, B or C for 160 kHz digital frequency counter reading.



Continued on next page.

3. Mode: reverse stereo record



Adjust C304 for 160 kHz digital frequency counter reading.

Specification: 160 kHz ± 10 %
frequency difference
between the modes: less than 2 kHz

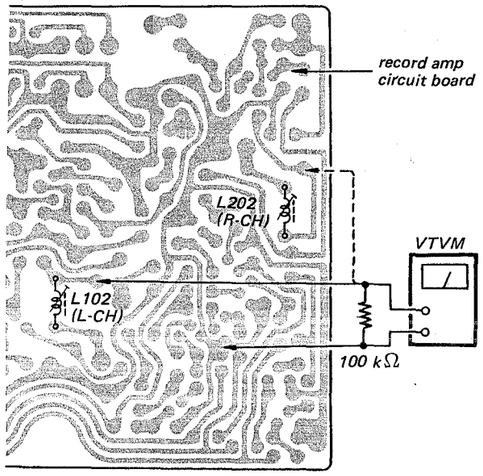
12. Bias Trap Adjustment

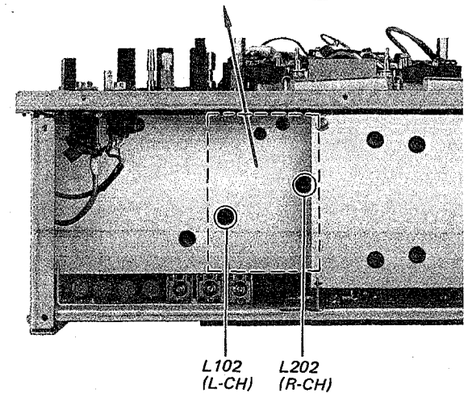
Settings:

REC VOL MIC: MIN
MONITOR switch: SOURCE

Procedure:

Mode: forward stereo record





Adjust	VTVM reading
L102 (L-CH) L202 (R-CH)	minimum

Specification: less than −6 dB (0.39 V)

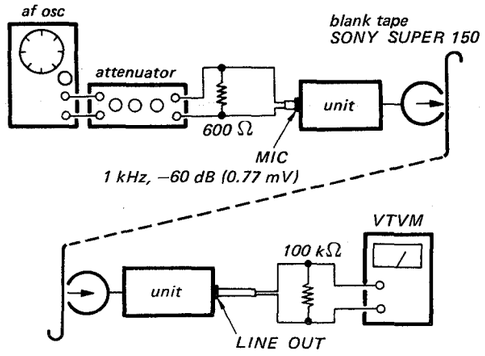
13. Record Bias Adjustment

Settings:

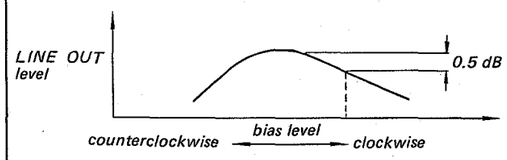
MONITOR switch: TAPE

Procedure:

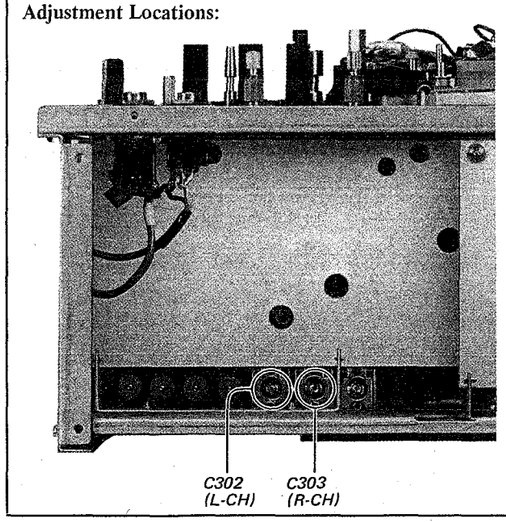
1. Mode: forward stereo record and simultaneous playback



2. Turn the bias adjustment trimmer capacitors C302 (L-CH) and C303 (R-CH) clockwise for maximum VTVM reading and then turn the capacitor clockwise so that VTVM reading drops 0.5 dB from the maximum value.



Adjustment Locations:



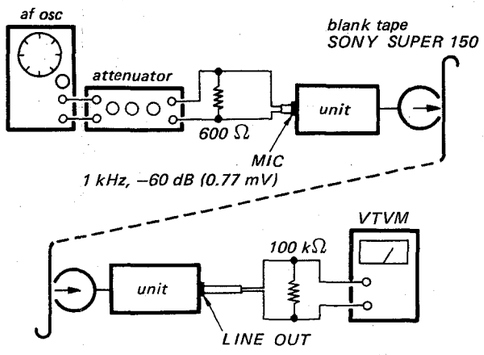
14. Record Level Adjustment

Settings:

MONITOR switch: TAPE

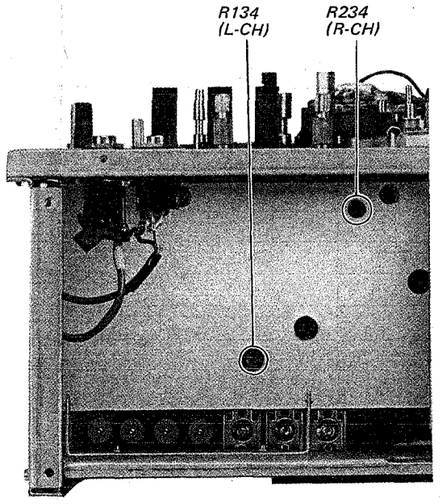
Procedure:

1. Mode: forward and reverse stereo records and simultaneous playbacks



Adjust	VTVM reading	Allowance
R134 (L-CH) R234 (R-CH)	0 dB (0.775 V)	between L-CH and R-CH: less than 1 dB between forward and reverse modes: less than 1 dB

Adjustment Locations:



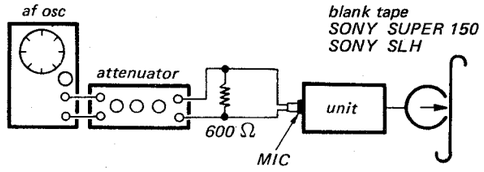
15. Overall Frequency Response Measurement

Settings:

MONITOR switch:	TAPE
REC VOL MIC control:	For 0 dB (0.775 V) LINE OUT level with 1 kHz, −60 dB (0.77 mV) MIC input signal in record mode.

Procedure:

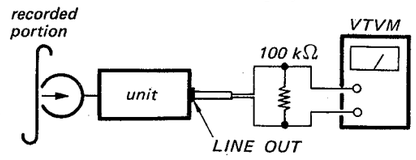
1. Mode: forward and reverse stereo records



1. 1 kHz (reference)
2. 50 Hz
3. 100 Hz
4. 5 kHz
5. 7 kHz
6. 12.5 kHz
7. 20 kHz

} −80 dB (77 μV)

2. Mode: forward and reverse playbacks



Playback	Output level difference from 1 kHz level	
	tape: SUPER 150 TAPE SELECT switch: NORMAL	tape: SLH TAPE SELECT switch: SPECIAL
1 kHz	0 dB	0 dB
50 Hz	±3 dB	±3 dB
100 Hz	±3 dB	±3 dB
5 kHz	±3 dB	±3 dB
7 kHz	±3 dB	±3 dB
12.5 kHz	±3 dB	±3 dB
20 kHz	$^{+3}_{-6}$ dB	±3 dB

Output level difference between forward and reverse playback modes: less than 2 dB

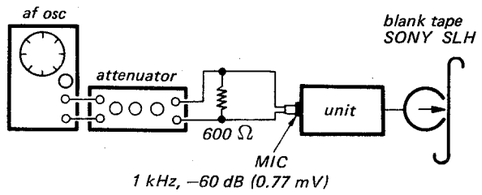
16. Overall Signal-to-Noise Ratio Measurement

Settings:

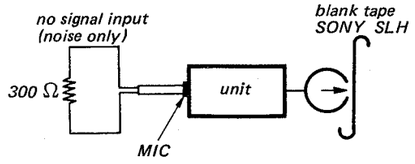
MONITOR switch:	TAPE
TAPE SELECT switch:	SPECIAL
REC VOL MIC control:	For 0 dB (0.775 V) LINE OUT level with 1 kHz, −60 dB (0.77 mV) MIC input signal in record mode.

Procedure:

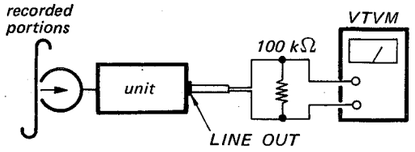
1. Mode: forward stereo record



2. Mode: forward stereo record



3. Mode: forward playback



Playback	VTVM reading
1 kHz	level difference: greater than 46 dB
no signal	

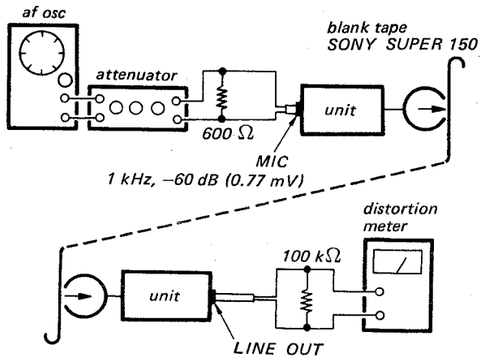
17. Overall Distortion Measurement

Settings:

MONITOR switch:	TAPE
REC VOL MIC control:	For 0 dB (0.775 V) LINE OUT level with 1 kHz, −60 dB (0.77 mV) MIC input signal in record mode.

Procedure:

1. Mode: forward stereo record and simultaneous playback



Specification: less than 1.5 %

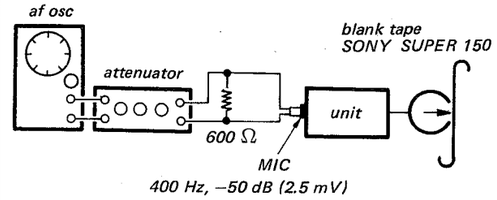
18. Erase Ratio Measurement

Settings:

MONITOR switch:	TAPE
REC VOL MIC control:	For 0 dB (0.775 V) LINE OUT level with 400 Hz, −60 dB (0.77 mV) MIC input signal in record mode.

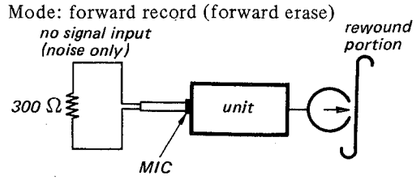
Procedure:

1. Mode: forward record

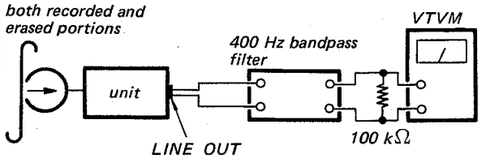


2. Rewind half of the recorded part.

3. Mode: forward record (forward erase)



4. Mode: forward playback



Playback	VTVM reading
400 Hz	level difference: greater than 65 dB
erased portion	

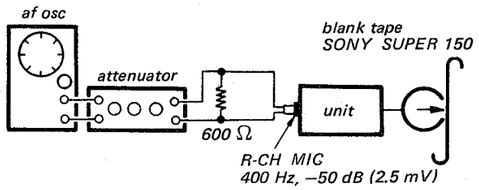
19. Cross Talk Measurement (between tracks)

Settings:

MONITOR switch:	TAPE
REC VOL MIC control:	For 0 dB (0.775 V) LINE OUT level with 400 Hz, −60 dB (0.77 mV) MIC input signal in record mode.

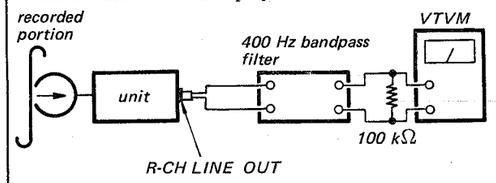
Procedure:

1. Mode: forward stereo record



2. Turn the reels over.

3. Mode: forward stereo playback



Playback	VTVM reading
400 Hz	level difference: greater than 65 dB
adjacent track of the recorded track	

When the specified value is not obtained, perform the height and azimuth adjustments for both the record and playback heads.

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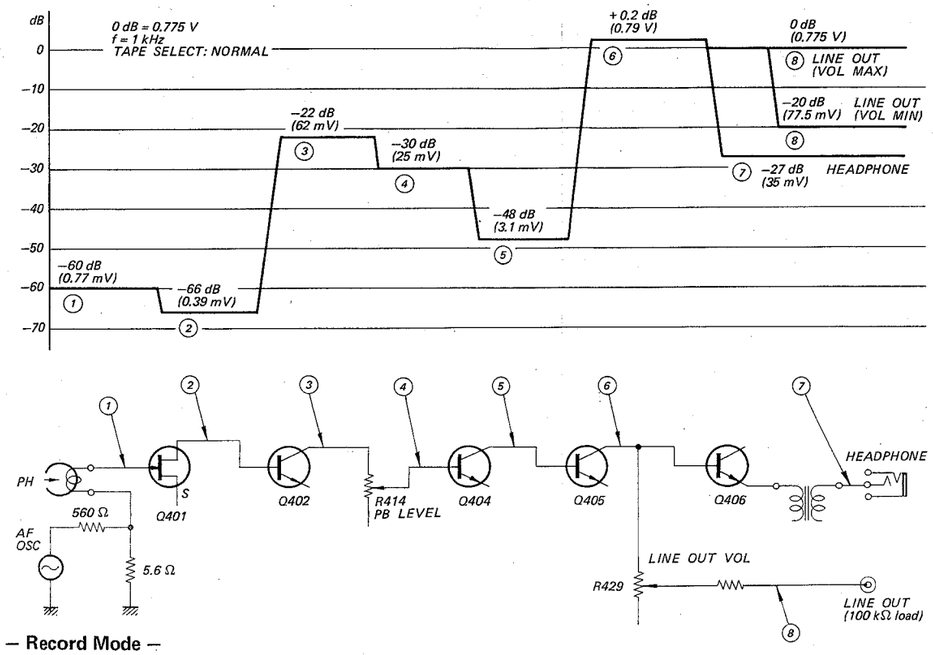
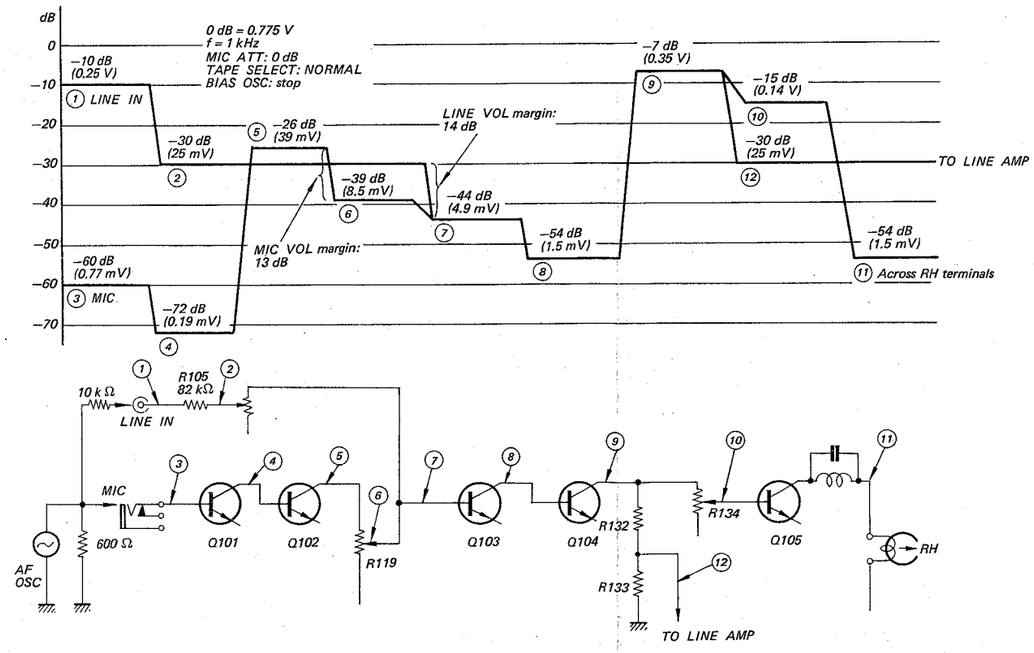
SECTION 4
DIAGRAMS

4-1. LEVEL DIAGRAMS

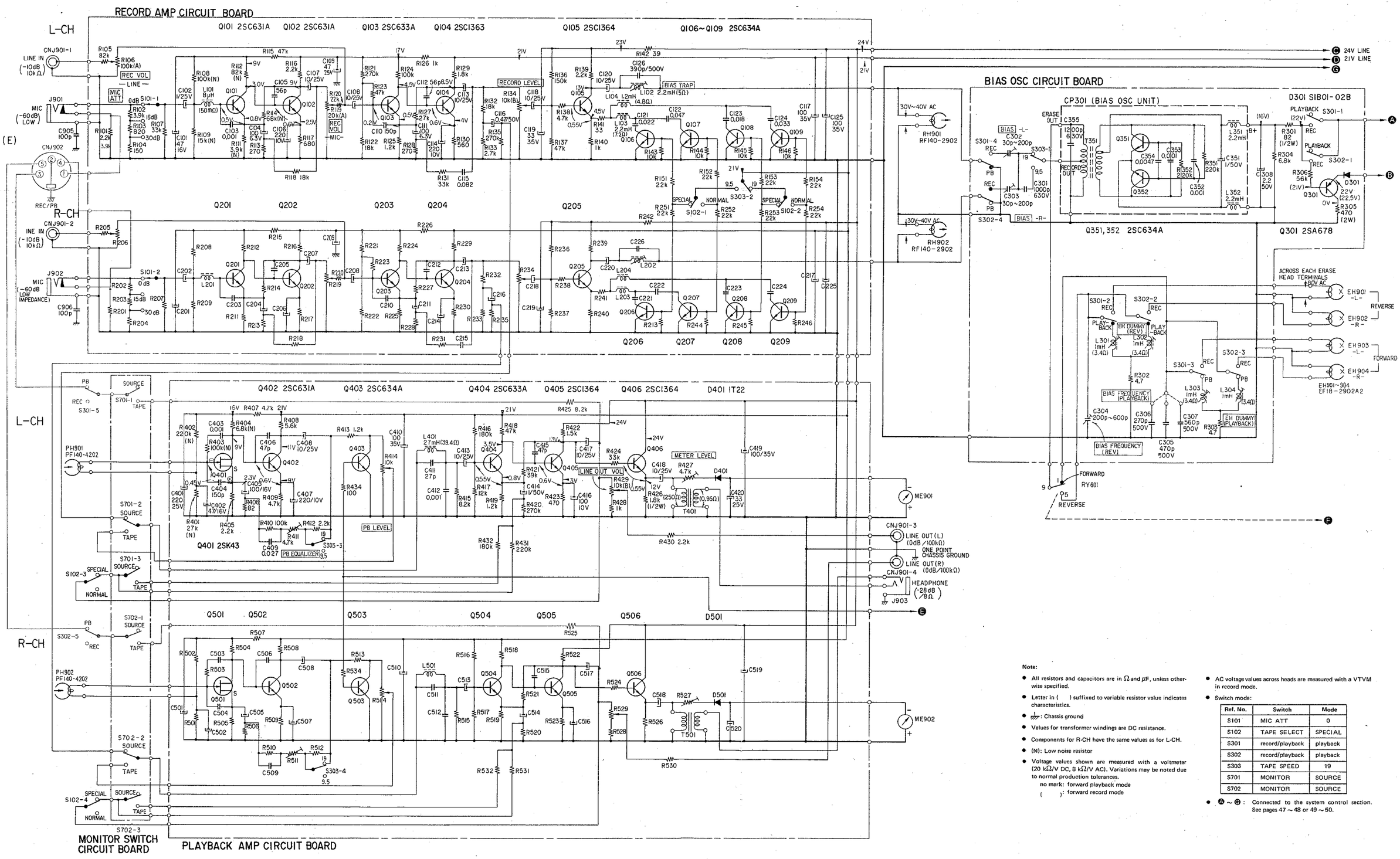
– Playback Mode –



– Record Mode –



4-2. SCHEMATIC DIAGRAM
– Amp Section –



Note:

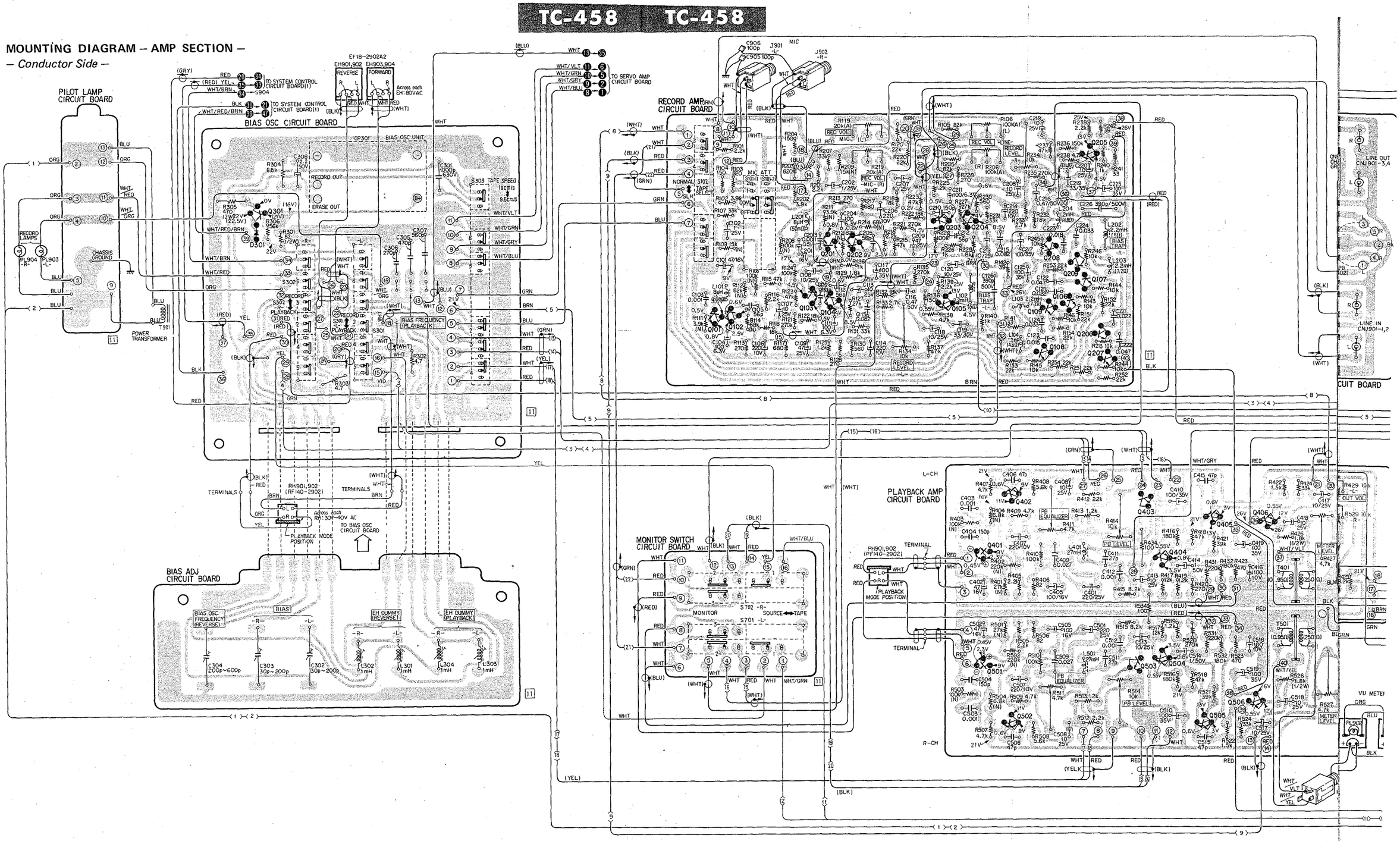
- All resistors and capacitors are in Ω and μF, unless otherwise specified.
- Letter in ( ) suffixed to variable resistor value indicates characteristics.
- ⏚: Chassis ground
- Values for transformer windings are DC resistance.
- Components for R-CH have the same values as for L-CH.
- (N): Low noise resistor
- Voltage values shown are measured with a voltmeter (20 kΩ/V DC, 8 kΩ/V AC). Variations may be noted due to normal production tolerances.
  no mark: forward playback mode
  ( ): forward record mode
- AC voltage values across heads are measured with a VTVM in record mode.
- Switch mode:

Ref. No.	Switch	Mode
S101	MIC ATT	0
S102	TAPE SELECT	SPECIAL
S301	record/playback	playback
S302	record/playback	playback
S303	TAPE SPEED	19
S701	MONITOR	SOURCE
S702	MONITOR	SOURCE

- Ⓐ ~ Ⓖ: Connected to the system control section. See pages 47 ~ 48 or 49 ~ 50.

4-3. MOUNTING DIAGRAM – AMP SECTION –

– Conductor Side –



Q	Q301 Q101 Q102 Q201 Q202 Q103 Q104 Q203 Q204 Q105 Q401 Q501 Q402 Q502 Q208 Q209 Q108 Q109 Q106 Q107 Q206 Q207 Q403 Q503 Q404 Q504 Q405 Q505 Q406 Q506
D	D301
ADJ	C306 C305 C307 C304 C303 C302 L302 L301 L304 L303 R134 L102 R234 L202 R411 R511 R414 R514 R427 R527

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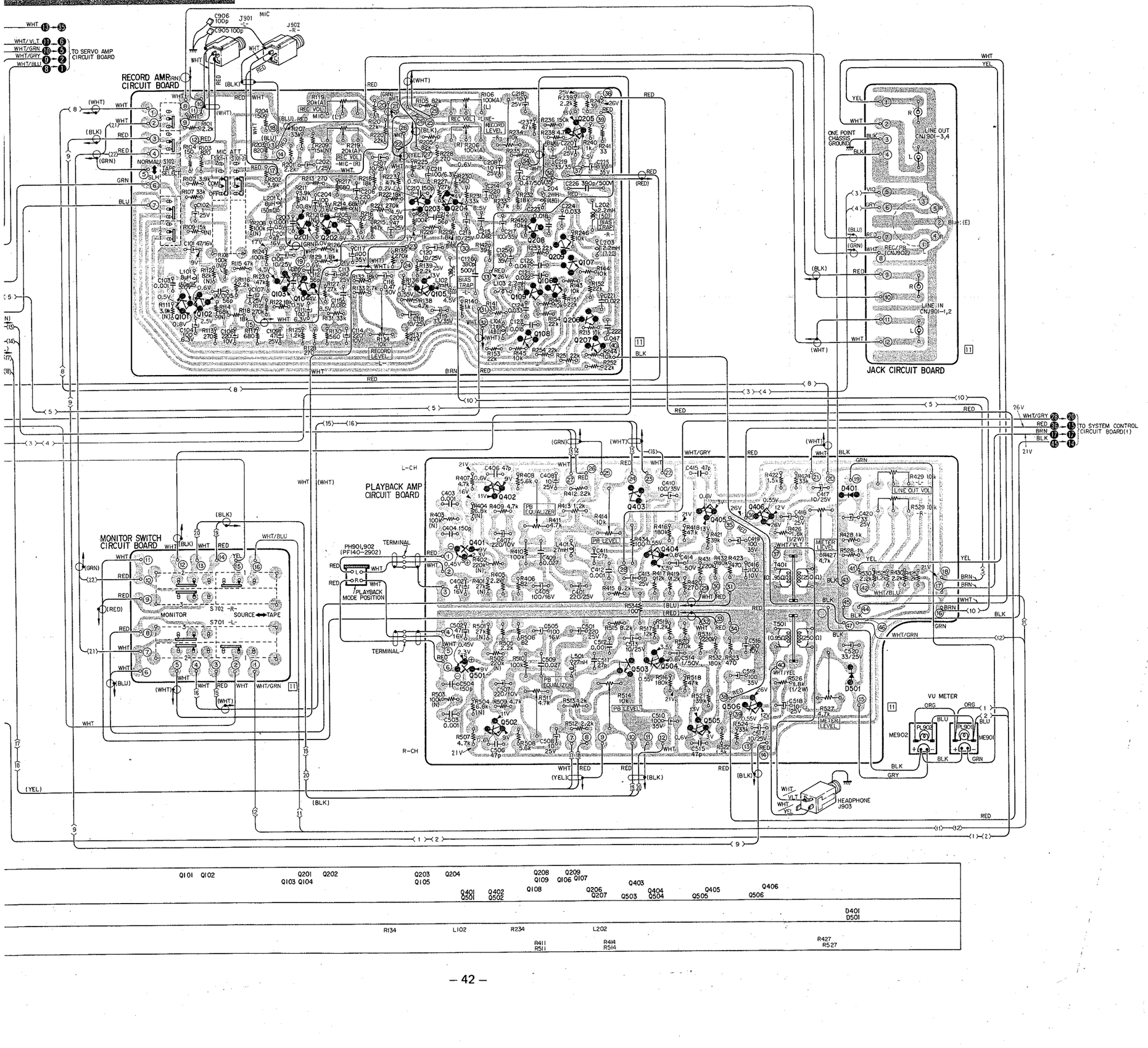
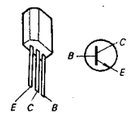


Q101, 102, 402
Q201, 202, 502:
2SC631A

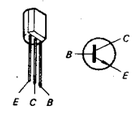
Q103, 404
Q203, 504:
2SC633A

Q106 ~ 109, 403
Q206 ~ 209, 503:
2SC634A

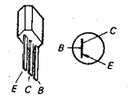


Q104
Q204:
2SC1363

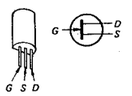
Q105, 405, 406
Q205, 505, 506:
2SC1364



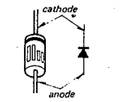
Q301:
2SA678



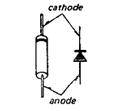
Q401
Q501:
2SK43



D301:
SIB01-02



D401
D501:
1T22



Note:

- All resistors and capacitors are in Ω and μF, unless otherwise specified.
- Letter in ( ) suffixed to variable resistor value indicates characteristics.
- ⏚ : Chassis ground
- Values for transformer windings are DC resistance.
- Components for R-CH have the same values as for L-CH.
- (N): Low noise resistor
- Voltage values shown are measured with a voltmeter (20 kΩ/V). Variations may be noted due to normal production tolerances.
  no mark: forward playback mode
  ( ): forward record mode
- AC voltage values across heads are measured with a VTVM in record mode.
- Switch mode:

Ref. No.	Switch	Mode
S101	MIC ATT	0
S102	TAPE SELECT	SPECIAL
S301	record/playback	playback
S302	record/playback	playback
S303	TAPE SPEED	19
S701	MONITOR	SOURCE
S702	MONITOR	SOURCE

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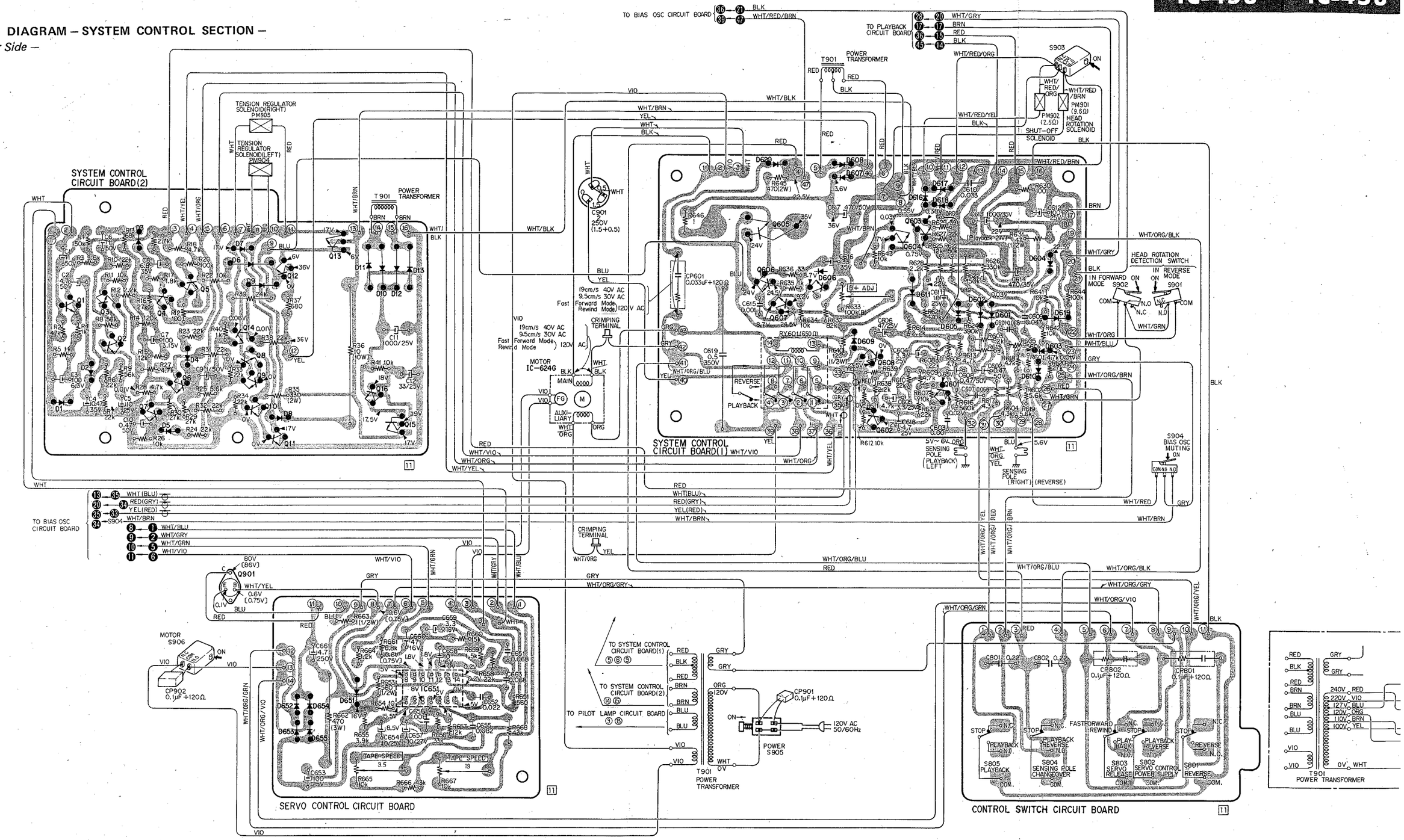
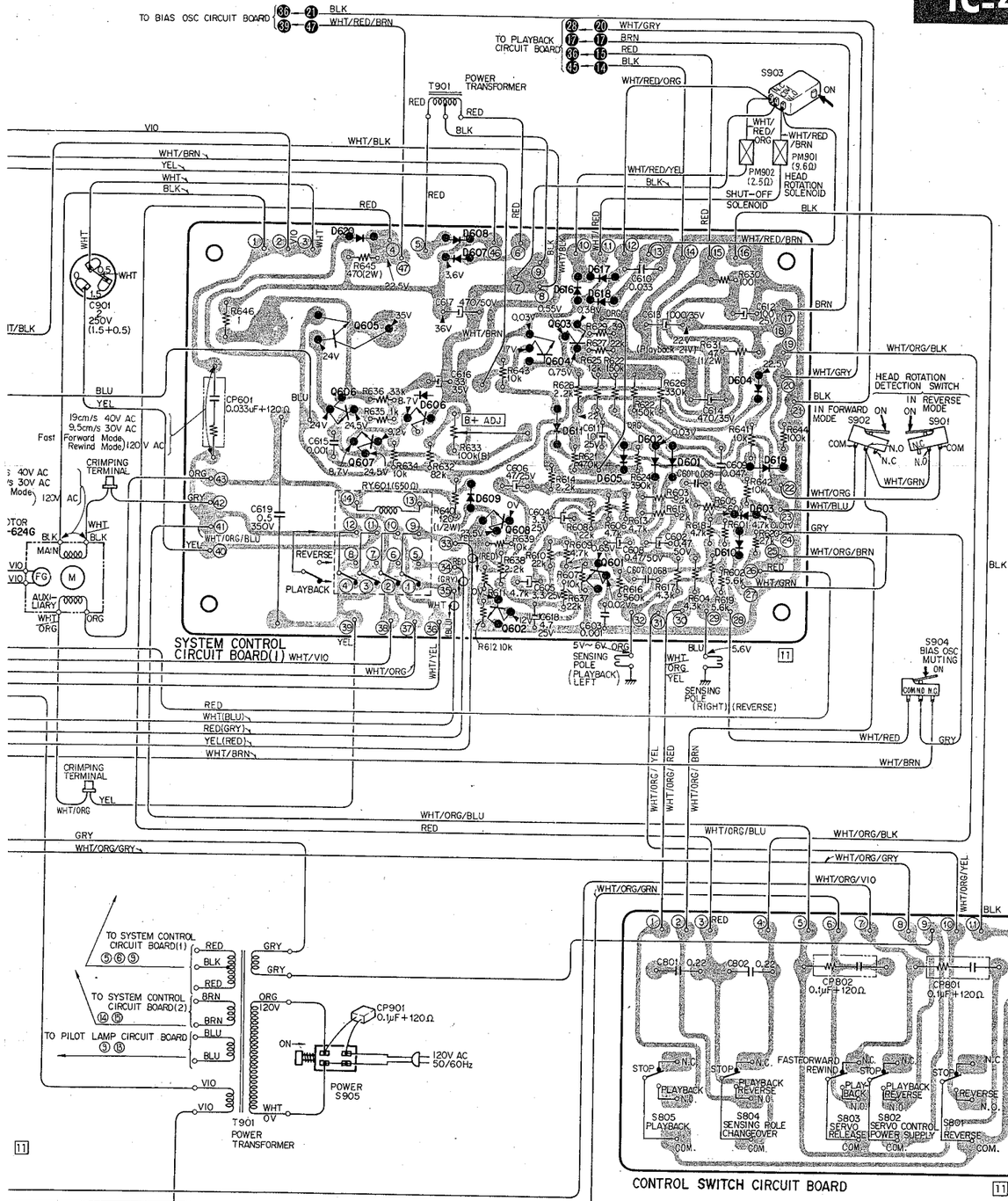
4-4. MOUNTING DIAGRAM – SYSTEM CONTROL SECTION –

– Conductor Side –



Q, IC	Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 IC651 Q601 Q602 Q603 Q604 Q605 Q606 Q607 Q608
D	D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D601 D602 D603 D604 D605 D606 D607 D608 D609 D610 D611 D616 D617 D618 D619 D620 D651 D652 D653 D654 D655
ADJ	R665 R667



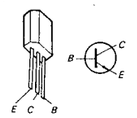
Q605
Q606
Q607
Q608 Q604 Q603
Q602 Q601
D620 D606 D608 D607 D609 D611 D616 D617 D618 D605 D602 D601 D604 D619 D603 D610

Note:

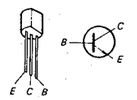
- All resistors and capacitors are in Ω and μF, unless otherwise specified.
- Letter in ( ) suffixed to variable resistor value indicates characteristics.
- ⏚: Chassis ground
- Values for transformer windings are DC resistance.
- Components for R-CH have the same values as for L-CH.
- (N): Low noise resistor
- Voltage values shown are measured with a voltmeter (20 kΩ/V). Variations may be noted due to normal production tolerances.
  no mark: playback mode voltage
  ( ): record mode voltage
- AC voltage values are measured with a VTVM in record mode.
- Switch mode:

Ref. No.	Switch	Mode
S801	reverse	stop
S802	servo control power	ON
S803	servo control release	playback
S804	sensing pole	stop
S805	playback	stop
S901	head rotation detector	playback
S902	head rotation detector	playback
S903	shut-off	OFF (no tape loaded)
S904	bias osc muting	OFF
S905	POWER	ON
S906	motor	ON

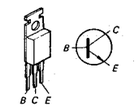
Q1 ~ 8, 10, 12, 14, 16
Q601 ~ 603, 606, 607:
2SC634A



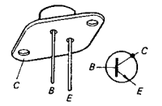
Q9, 11:
2SC1475



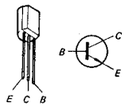
Q13, 15, 604:
2SC1061C



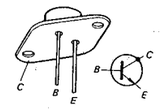
Q605:
2SD291



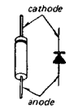
Q608:
2SC1364



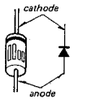
Q901:
2SC867



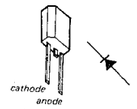
D1 ~ 6, 9,
D601, 602, 611, 619:
1T40



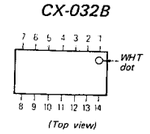
D7, 8, 10 ~ 13
D603 ~ 605, 607 ~ 610
D616 ~ 618, 620
D651 ~ 655:
SIB01-02



D606:
MZ-08

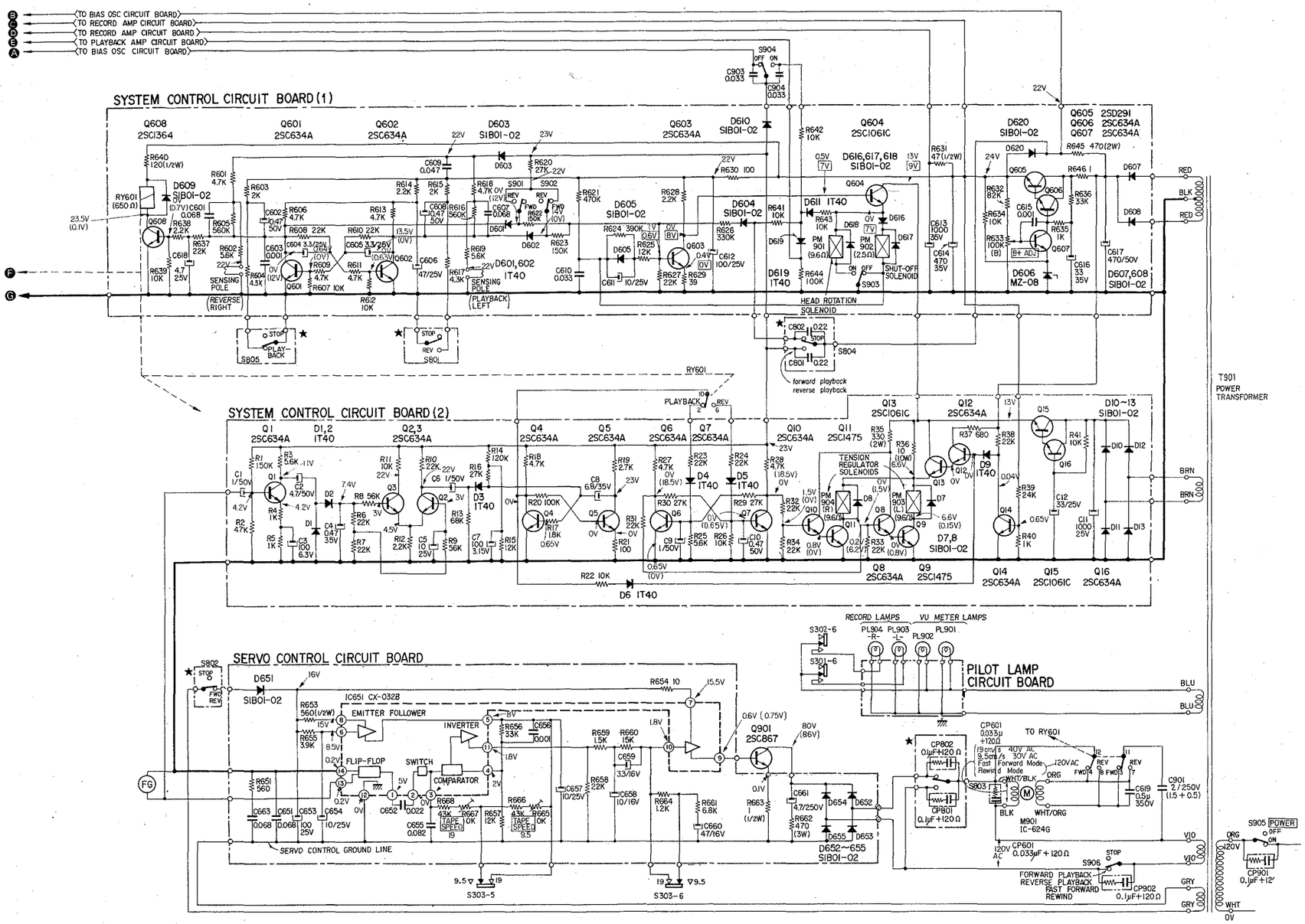


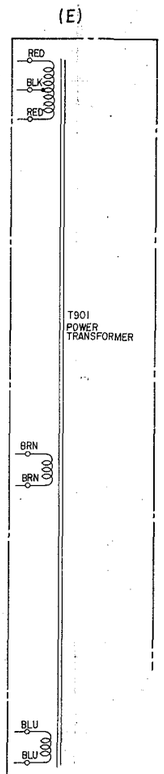
IC651:
CX-032B



4-5. SCHEMATIC DIAGRAM – SYSTEM CONTROL SECTION –

– Playback Mode –





Note:

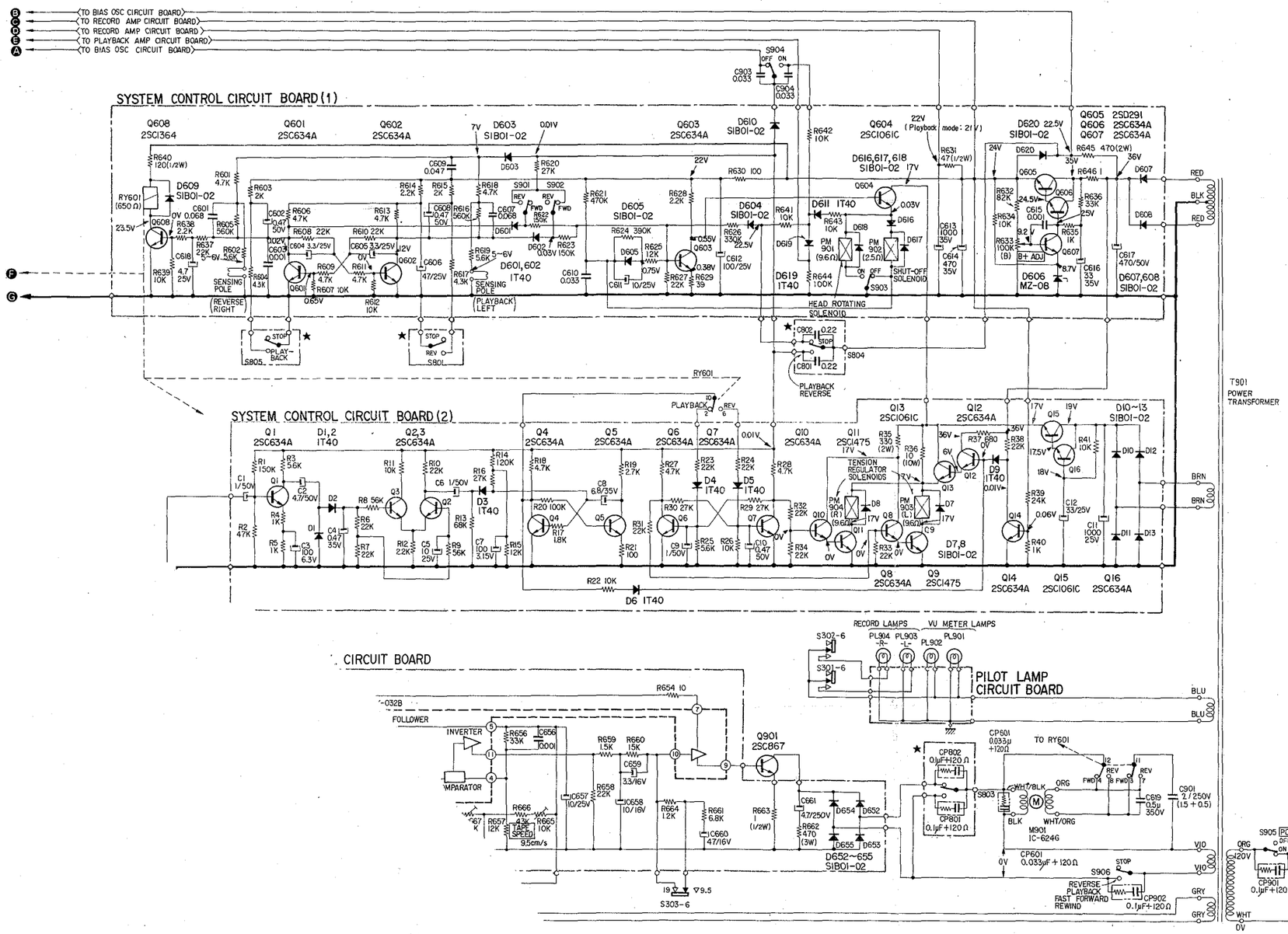
- All resistors and capacitors are in Ω and μF, unless otherwise specified.
- Letter in ( ) suffixed to variable resistor value indicates characteristics.
- ⏚: Chassis ground
- Values for transformer windings are DC resistance.
- Components for R-CH have the same values as for L-CH.
- (N): Low noise resistor
- Voltage values shown are measured with a voltmeter (20 kΩ/V). Variations may be noted due to normal production tolerances.
  - no mark: forward playback with tape, at TAPE SPEED of 19
  - ( ): reverse playback with tape
  - { }: forward playback at TAPE SPEED 9.5
  - ▭: instantaneous voltage at rotary ferrite head rotation from forward playback to reverse playback at TAPE SPEED of 19

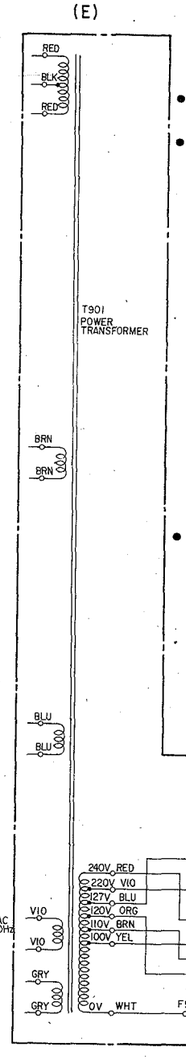
  Voltages for servo control circuit are measured with reference to the servo control ground line.
- Parts marked ★ are included in the control switch circuit board.
- Switch mode:

Ref. No.	Switch	Mode
S801	reverse	stop
S802	servo control power	ON
S803	servo control release	playback
S804	sensing pole	stop
S805	playback	stop
S901	head rotation detector	p!
S902	head rotation detector	
S903	shut-off	
S904		

4-6. SCHEMATIC DIAGRAM – SYSTEM CONTROL SECTION –

– Stop Mode –





Note:

- All resistors and capacitors are in Ω and μF, unless otherwise specified.
- Letter in ( ) suffixed to variable resistor value indicates characteristics.
- ⏚: Chassis ground
- Values for transformer windings are DC resistance.
- Components for R-CH have the same values as for L-CH.
- (N): Low noise resistor
- Voltage values shown are measured with a voltmerer (20 kΩ/V). Variations may be noted due to normal production tolerances.

  Measurement is made with tape threaded, and the stop lever pressed after once the unit is played in forward playback mode.
- Parts marked ★ are included in the control switch circuit board.
- Switch mode:

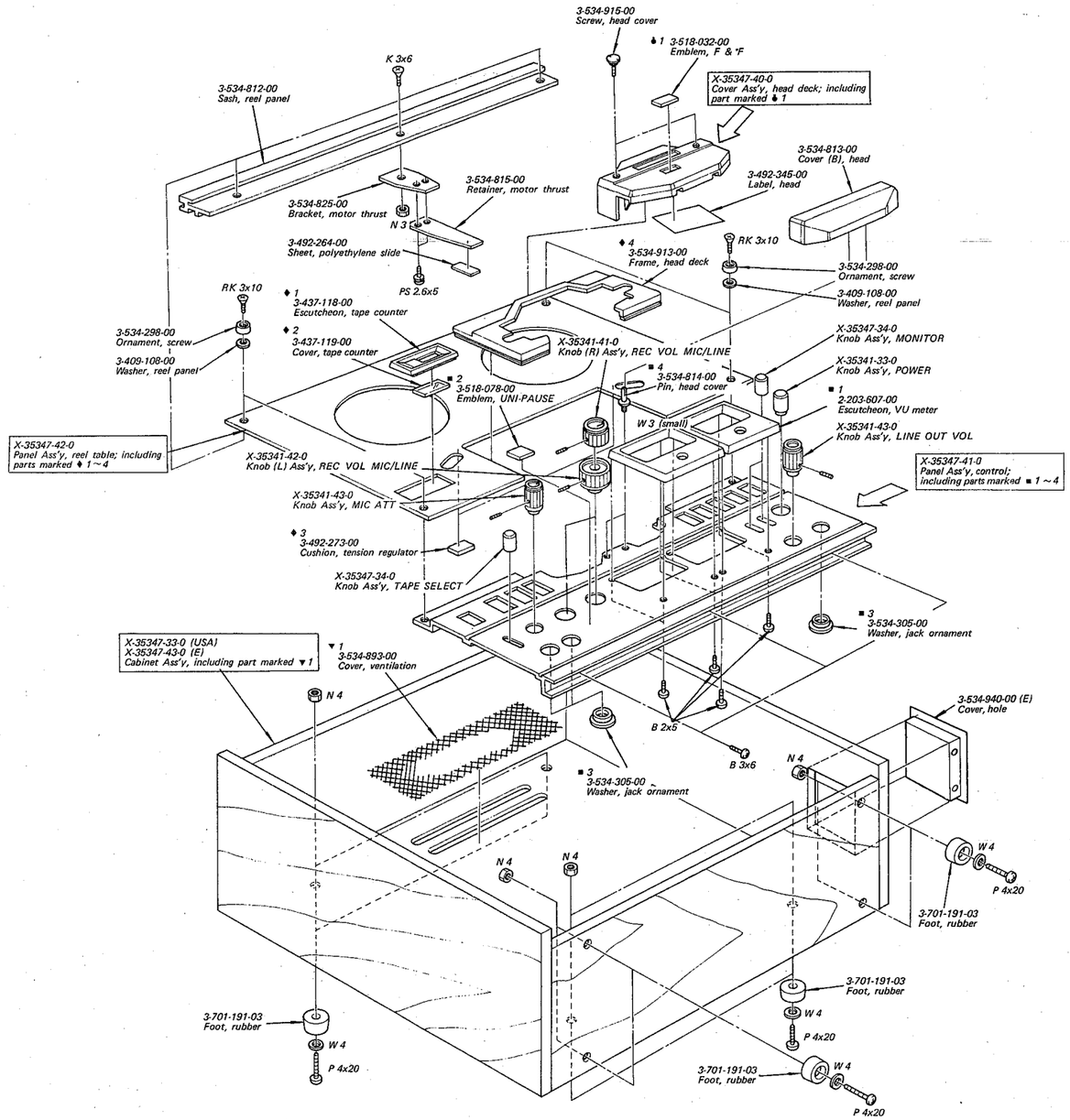
Ref. No.	Switch	Mode
S801	reverse	stop
S802	servo control power	OFF
S804	sensing pole	stop
S805	playback	stop
S901	head rotation detector	playback
S902	head rotation detector	playback
S903	shut-off	OFF (no tape loaded)
S904	bias osc muting	OFF
S905	POWER	ON
S906	motor	OFF

- Ⓐ ~ Ⓖ : Connected to amp section. See page 40.

SECTION 5

EXPLODED VIEWS AND PACKING

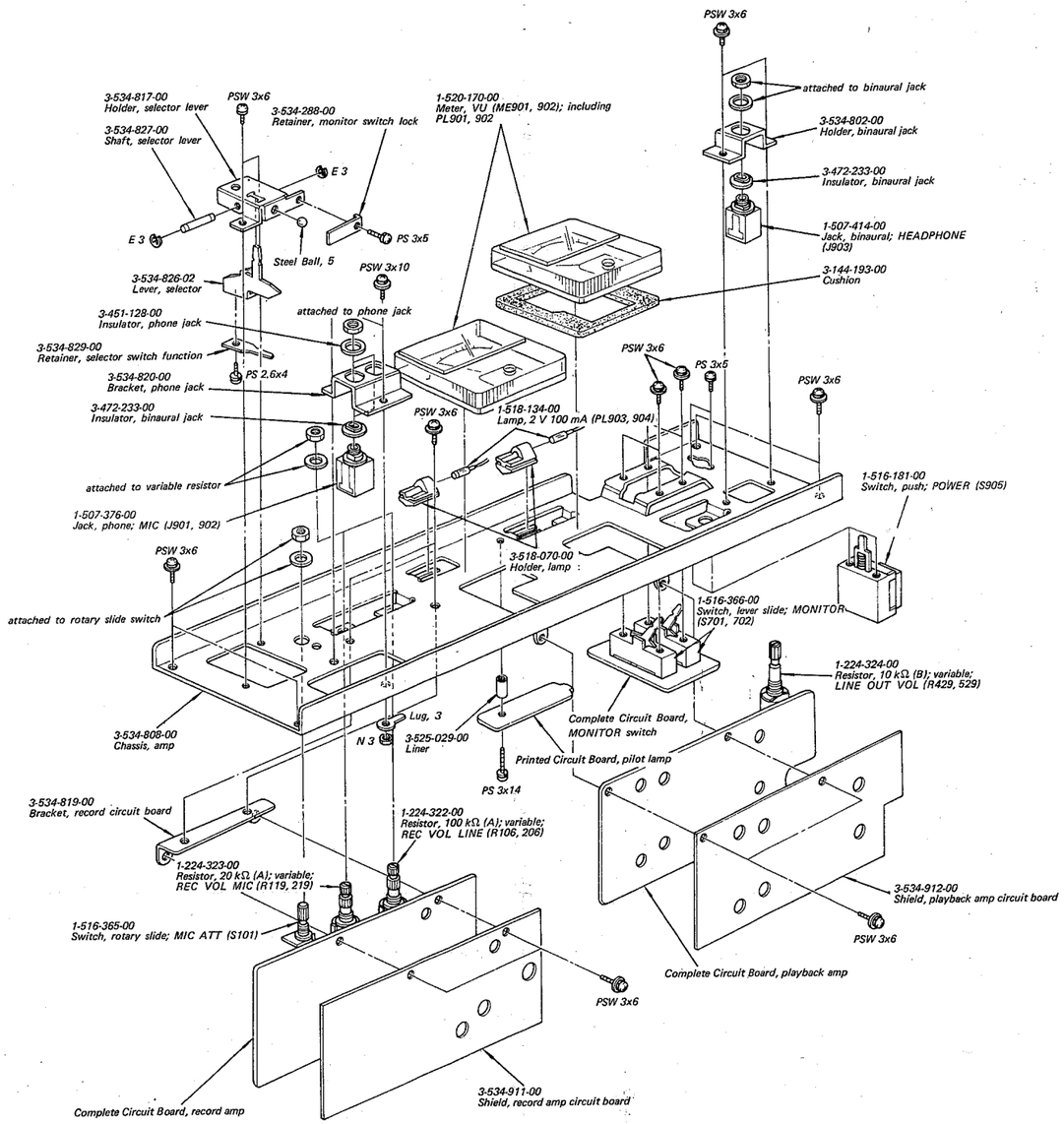
5-1. EXPLODED VIEW (1)



Note: 1. Parts without part numbers and names are not available.

2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head

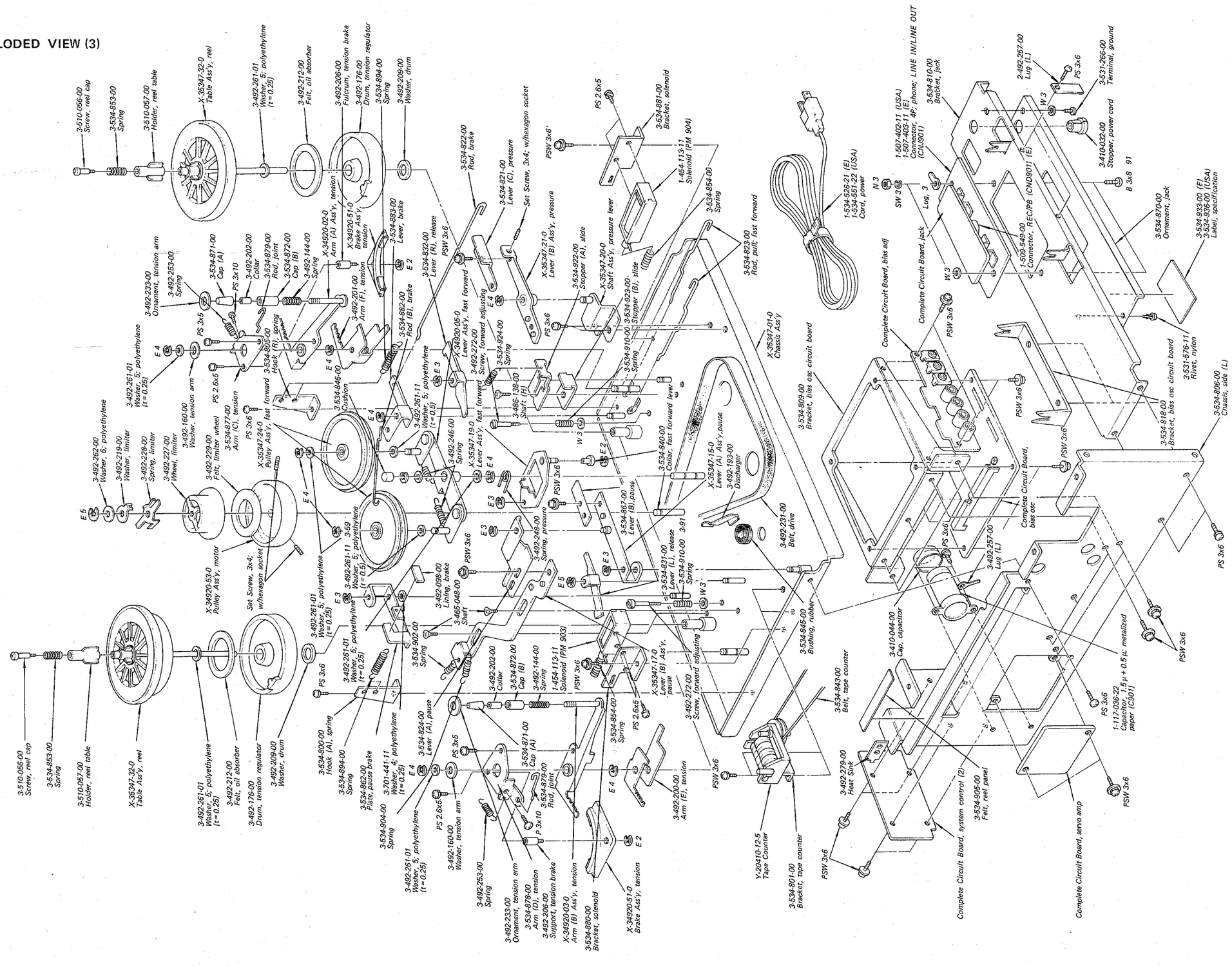
5-2. EXPLODED VIEW (2)



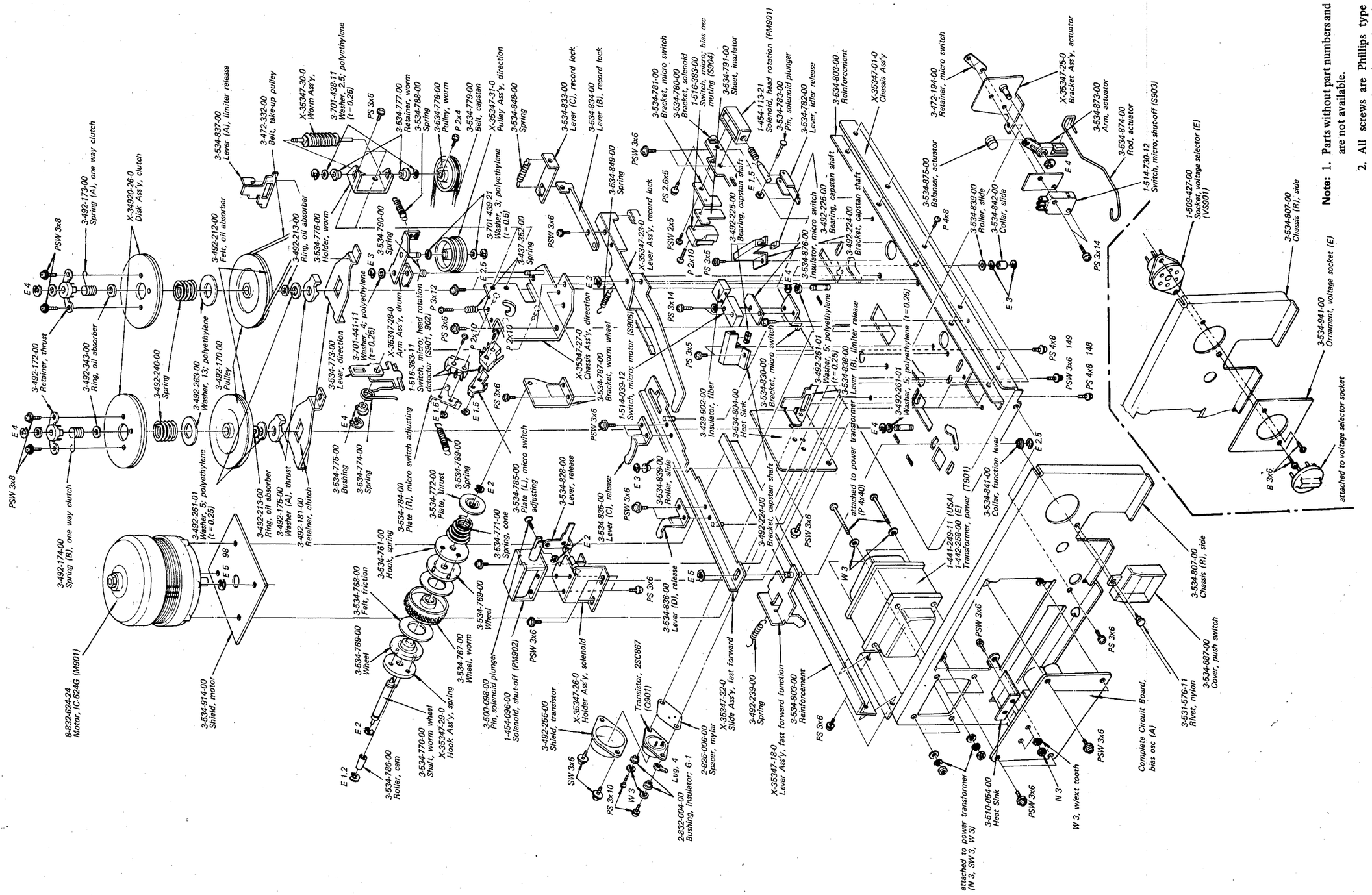
Note: 1. Parts without part numbers and names are not available.

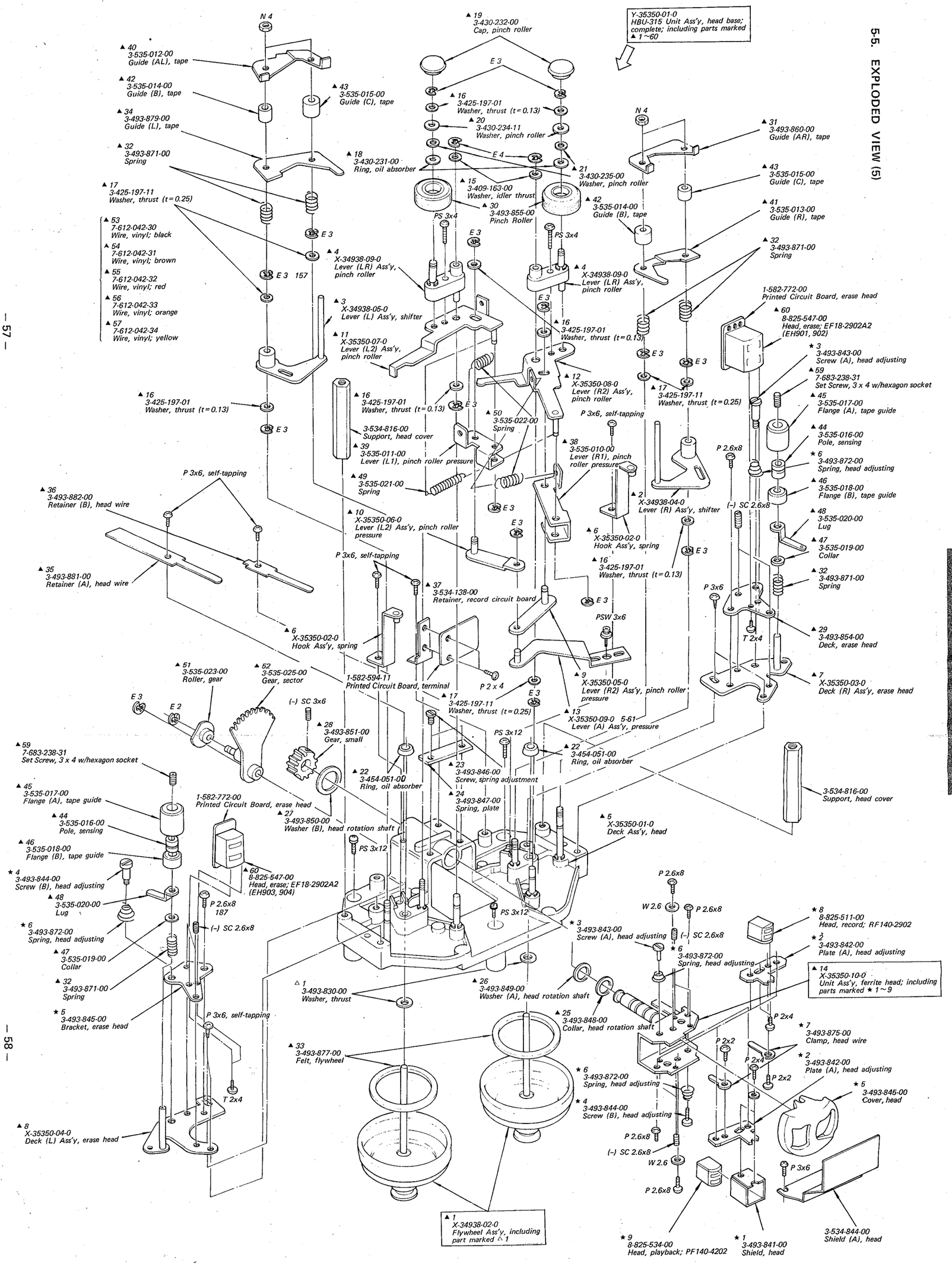
2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head

5-3. EXPLODED VIEW (3)


3-510-056-00 Screw, reel cap
3-534-853-00 Spring
3-510-057-00 Holder, reel table
X-35347-32-0 Table Ass'y, reel
3-492-261-01 Washer, 5; polyethylene (t=0.25)
3-492-212-00 Felt, oil absorber
3-492-206-00 Fulcrum, tension brake
3-492-176-00 Drum, tension regulator
3-534-894-00 Spring
3-492-209-00 Washer, drum
3-534-822-00 Rod, brake
3-534-821-00 Lever (C), pressure
Set Screw, 3x4; w/hexagon socket
PSW 3x6
PS 2.6x5
3-534-881-00 Bracket, solenoid
1-454-113-11 Solenoid (PM 904)
3-534-854-00 Spring
3-534-823-00 Rod, pull; fast forward
X-35347-01-0 Chassis Ass'y
1-534-526-21 (E)
1-534-651-22 (USA)
Cord, power
1-507-402-11 (USA)
1-507-403-11 (E)
Connector, 4P; phone; LINE IN/LINE OUT (CNJ901)
3-534-810-00 Bracket, jack
2-492-257-00 Lug (L)
3-531-266-00 Terminal, ground
3-410-032-00 Stopper, power cord
B 3x8
1-509-549-00 Connector, REC/PB (CND901) (E)
3-534-870-00 Ornament, jack
3-534-933-00 (E)
3-534-936-00 (USA) Label, specification
3-534-806-00 Chassis, side (L)
3-531-576-11 Rivet, nylon
3-534-818-00 Bracket, bias osc circuit board
3-534-809-00 Bracket, bias osc circuit board
Complete Circuit Board, bias adj
Complete Circuit Board, jack
Lug, 3
W 3
PSW 3x6
3-534-871-00 Cap (A)
3-534-872-00 Cap (B)
3-492-202-00 Collar
3-534-880-00 Hook (B), spring
3-534-846-00 Cushion
3-534-877-00 Arm (C), tension
3-492-160-00 Washer, tension arm
3-492-263-00 Washer, 6; polyethylene
3-492-219-00 Washer, limiter
3-492-228-00 Spring, limiter
3-492-227-00 Wheel, limiter
3-492-229-00 Felt, limiter wheel
X-35347-24-0 Pulley Ass'y, fast forward
X-34920-53-0 Pulley Ass'y, motor
Set Screw, 3x4; w/hexagon socket
3-492-233-00 Ornament, tension arm
3-492-253-00 Spring
3-492-261-11 Washer, 5; polyethylene (t=0.5)
3-492-246-00 Spring
X-35347-19-0 Lever Ass'y, fast forward
3-534-924-00 Spring
3-466-138-00 Shaft (H)
3-534-840-00 Collar, fast forward lever
X-35347-15-0 Lever (A) Ass'y, pause
3-492-193-00 Discharger
3-534-867-00 Lever (B), pause
3-492-249-00 Spring, pressure
3-534-831-00 Lever (L), release
3-534-910-00 Spring
3-492-231-00 Belt, drive
3-534-845-00 Bushing, rubber
3-534-843-00 Belt, tape counter
3-492-279-00 Heat Sink
3-534-801-00 Bracket, tape counter
Y-20410-12-5 Tape Counter
3-492-200-00 Arm (E), tension
3-534-854-00 Spring
PS 2.6x5
3-534-904-00 Spring
3-534-862-00 Plate, pause brake
3-534-824-00 Lever (A), pause
3-534-800-00 Hook (A), spring
3-534-902-00 Spring
3-492-098-00 Lining, brake
3-465-048-00 Shaft
3-534-883-00 Lever, brake
3-534-822-00 Lever (R), release
3-534-882-00 Rod (B), brake
3-534-820-00 Lever Ass'y, fast forward
3-492-272-00 Screw, forward adjusting
3-534-922-00 Stopper (A), slide
3-534-923-00 Stopper (B), slide
3-534-910-00 Spring
X-35347-20-0 Shaft Ass'y, pressure lever
X-35347-21-0 Lever (B) Ass'y, pressure
X-35347-17-0 Lever (B) Ass'y, pause
3-534-839-00 Lever (B), fast forward
3-534-879-00 Rod, joint
3-534-878-00 Arm (D), tension
3-492-206-00 Support, tension brake
X-34920-03-0 Arm (B) Ass'y, tension
3-534-880-00 Bracket, solenoid
X-34920-51-0 Brake Ass'y, tension
3-534-880-00 Bracket, solenoid
3-492-144-00 Spring
3-492-201-00 Arm (F), tension
3-492-261-01 Washer, 5; polyethylene (t=0.25)
3-492-233-00 Ornament, tension arm
3-492-263-00 Spring
3-534-871-00 Cap (A)
3-492-202-00 Collar
3-534-878-00 Rod, joint
3-534-872-00 Cap (B)
3-492-144-00 Spring
X-34920-02-0 Arm (A) Ass'y, tension
3-534-883-00 Lever, brake
3-534-822-00 Lever (R), release
PSW 3x6
3-534-882-00 Rod (B), brake
3-534-820-00 Lever Ass'y, fast forward
3-492-272-00 Screw, forward adjusting
3-534-924-00 Spring
3-534-839-00 Lever (B), fast forward
3-534-840-00 Collar, fast forward lever
3-534-867-00 Lever (B), pause
3-492-249-00 Spring, pressure
3-534-831-00 Lever (L), release
3-534-910-00 Spring
3-534-854-00 Spring
3-534-823-00 Rod, pull; fast forward
3-534-922-00 Stopper (A), slide
3-534-923-00 Stopper (B), slide
X-35347-20-0 Shaft Ass'y, pressure lever
X-35347-21-0 Lever (B) Ass'y, pressure
PS 2.6x5
3-534-881-00 Bracket, solenoid
1-454-113-11 Solenoid (PM 904)
X-35347-01-0 Chassis Ass'y
3-534-809-00 Bracket, bias osc circuit board
1-534-526-21 (E)
1-534-651-22 (USA)
Cord, power
1-507-402-11 (USA)
1-507-403-11 (E)
Connector, 4P; phone; LINE IN/LINE OUT (CNJ901)
3-534-810-00 Bracket, jack
2-492-257-00 Lug (L)
3-531-266-00 Terminal, ground
3-410-032-00 Stopper, power cord
B 3x8
1-509-549-00 Connector, REC/PB (CND901) (E)
3-534-870-00 Ornament, jack
3-534-933-00 (E)
3-534-936-00 (USA) Label, specification
3-534-806-00 Chassis, side (L)
3-531-576-11 Rivet, nylon
3-534-818-00 Bracket, bias osc circuit board
Complete Circuit Board, bias adj
Complete Circuit Board, jack
Lug, 3
W 3
PSW 3x6
3-534-871-00 Cap (A)
3-534-872-00 Cap (B)
3-492-202-00 Collar
3-534-880-00 Hook (B), spring
3-534-846-00 Cushion
3-534-877-00 Arm (C), tension
3-492-160-00 Washer, tension arm
3-492-263-00 Washer, 6; polyethylene
3-492-219-00 Washer, limiter
3-492-228-00 Spring, limiter
3-492-227-00 Wheel, limiter
3-492-229-00 Felt, limiter wheel
X-35347-24-0 Pulley Ass'y, fast forward
X-34920-53-0 Pulley Ass'y, motor
Set Screw, 3x4; w/hexagon socket
3-492-233-00 Ornament, tension arm
3-492-253-00 Spring
3-492-261-11 Washer, 5; polyethylene (t=0.5)
3-492-246-00 Spring
X-35347-19-0 Lever Ass'y, fast forward
3-534-924-00 Spring
3-466-138-00 Shaft (H)
3-534-840-00 Collar, fast forward lever
X-35347-15-0 Lever (A) Ass'y, pause
3-492-193-00 Discharger
3-534-867-00 Lever (B), pause
3-492-249-00 Spring, pressure
3-534-831-00 Lever (L), release
3-534-910-00 Spring
3-492-231-00 Belt, drive
3-534-845-00 Bushing, rubber
3-534-843-00 Belt, tape counter
3-492-279-00 Heat Sink
3-534-801-00 Bracket, tape counter
Y-20410-12-5 Tape Counter
3-492-200-00 Arm (E), tension
3-534-854-00 Spring
PS 2.6x5
3-534-904-00 Spring
3-534-862-00 Plate, pause brake
3-534-824-00 Lever (A), pause
3-534-800-00 Hook (A), spring
3-534-902-00 Spring
3-492-098-00 Lining, brake
3-465-048-00 Shaft
3-534-883-00 Lever, brake
3-534-822-00 Lever (R), release
3-534-882-00 Rod (B), brake
3-534-820-00 Lever Ass'y, fast forward
3-492-272-00 Screw, forward adjusting
3-534-924-00 Spring
3-534-922-00 Stopper (A), slide
3-534-923-00 Stopper (B), slide
3-534-910-00 Spring
X-35347-20-0 Shaft Ass'y, pressure lever
X-35347-21-0 Lever (B) Ass'y, pressure
X-35347-17-0 Lever (B) Ass'y, pause
3-534-839-00 Lever (B), fast forward
3-534-879-00 Rod, joint
3-534-878-00 Arm (D), tension
3-492-206-00 Support, tension brake
X-34920-03-0 Arm (B) Ass'y, tension
3-534-880-00 Bracket, solenoid
X-34920-51-0 Brake Ass'y, tension
3-534-880-00 Bracket, solenoid
3-492-144-00 Spring
3-492-201-00 Arm (F), tension
3-492-261-01 Washer, 5; polyethylene (t=0.25)
3-492-233-00 Ornament, tension arm
3-492-263-00 Spring
3-534-871-00 Cap (A)
3-492-202-00 Collar
3-534-878-00 Rod, joint
3-534-872-00 Cap (B)
3-492-144-00 Spring
X-34920-02-0 Arm (A) Ass'y, tension
3-534-883-00 Lever, brake
3-534-822-00 Lever (R), release
PSW 3x6
3-534-882-00 Rod (B), brake
3-534-820-00 Lever Ass'y, fast forward
3-492-272-00 Screw, forward adjusting
3-534-924-00 Spring
3-534-839-00 Lever (B), fast forward
3-534-840-00 Collar, fast forward lever
3-534-867-00 Lever (B), pause
3-492-249-00 Spring, pressure
3-534-831-00 Lever (L), release
3-534-910-00 Spring
3-534-854-00 Spring
3-534-823-00 Rod, pull; fast forward
3-534-922-00 Stopper (A), slide
3-534-923-00 Stopper (B), slide
X-35347-20-0 Shaft Ass'y, pressure lever
X-35347-21-0 Lever (B) Ass'y, pressure
X-35347-17-0 Lever (B) Ass'y, pause

5-4. EXPLODED VIEW (4)

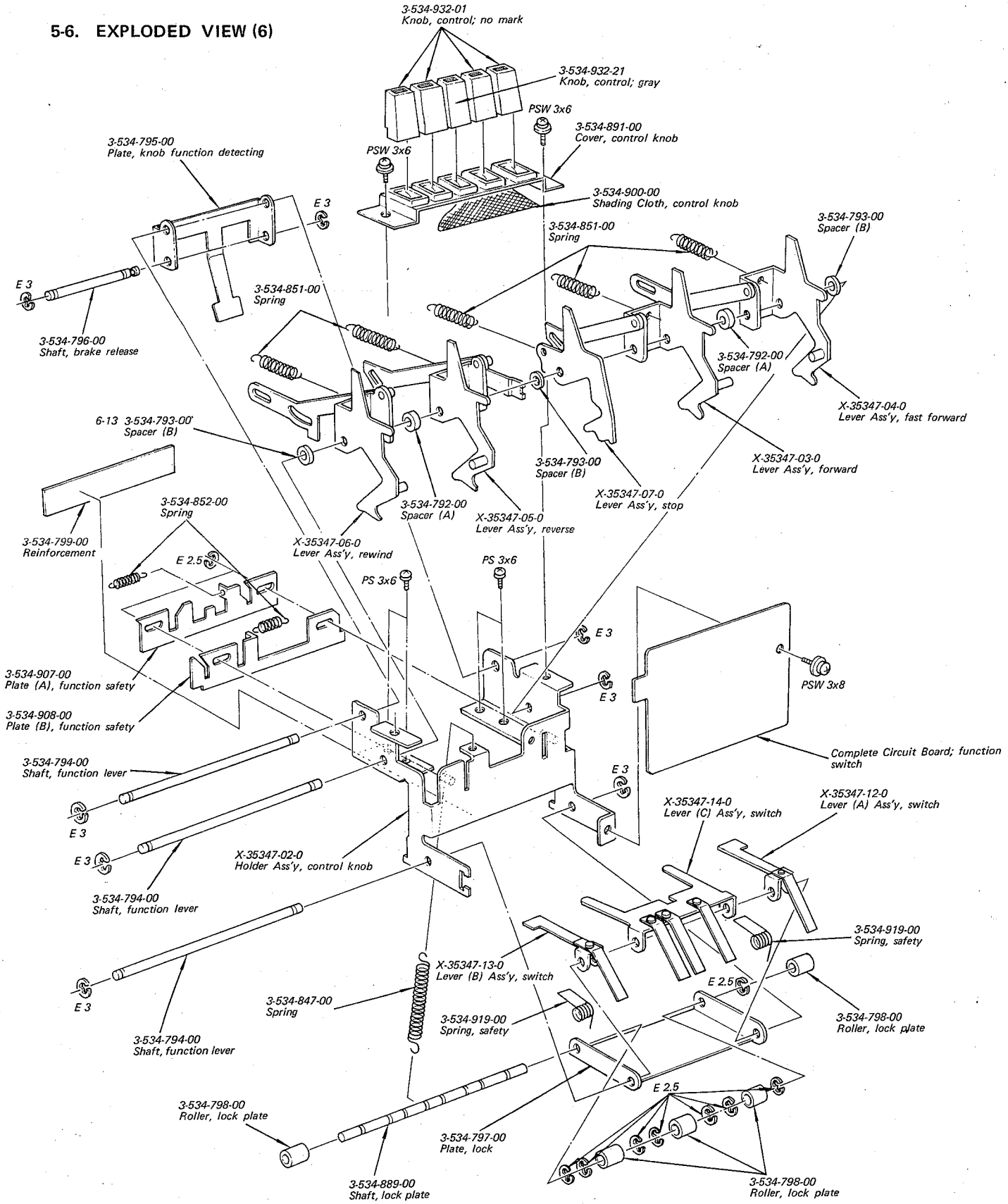

3-534-837-00 Lever (A), limiter release
3-472-332-00 Belt, take-up pulley
X-35347-30-0 Worm Ass'y,
3-701-438-11 Washer, 2.5; polyethylene (t=0.25)
PS 3x6
3-534-777-00 Retainer, worm
3-534-788-00 Spring
3-534-778-00 Pulley, worm
P 2x4
3-534-779-00 Belt, capstan
X-35347-31-0 Pulley Ass'y, direction
3-534-848-00 Spring
3-534-833-00 Lever (C), record lock
3-534-834-00 Lever (B), record lock
3-534-849-00 Spring
PSW 3x6
3-534-781-00 Bracket, micro switch
3-534-780-00 Bracket, solenoid
1-516-383-00 Switch, micro; bias osc muting (S904)
3-534-791-00 Sheet, insulator
1-454-113-21 Solenoid, head rotation (PM901)
3-534-783-00 Pin, solenoid plunger
3-534-782-00 Lever, idler release
3-534-803-00 Reinforcement
X-35347-01-0 Chassis Ass'y
3-472-194-00 Retainer, micro switch
3-534-876-00 Balanser, actuator
P 4x8
3-534-839-00 Roller, slide
3-534-842-00 Collar, slide
X-35347-25-0 Bracket Ass'y, actuator
3-534-873-00 Arm, actuator
3-534-874-00 Rod, actuator
1-514-730-12 Switch, micro; shut-off (S903)
1-509-427-00 Socket, voltage selector (E)
(VS901)
3-534-807-00 Chassis (R), side
3-534-941-00 Ornament; voltage socket (E)
B 3x6
attached to voltage selector socket
3-492-212-00 Felt, oil absorber
3-492-213-00 Ring, oil absorber
3-534-776-00 Holder, worm
3-534-790-00 Spring
3-534-775-00 Bushing
3-534-774-00 Spring
3-534-772-00 Plate, thrust
3-534-789-00 Spring
3-534-784-00 Plate (R), micro switch adjusting
3-534-771-00 Spring, cone
3-534-785-00 Plate (L), micro switch adjusting
3-534-828-00 Lever, release
3-534-835-00 Lever (C), release
3-534-839-00 Roller, slide
3-534-836-00 Lever (D), release
3-534-768-00 Felt, friction
3-534-761-00 Hook, spring
3-534-769-00 Wheel
3-534-767-00 Wheel, worm
3-534-914-00 Shield, motor
8-832-624-24 Motor, IC-624G (M901)
3-534-770-00 Shaft, worm wheel
X-35347-29-0 Hook Ass'y, spring
3-534-786-00 Roller, cam
3-500-098-00 Pin, solenoid plunger
1-454-096-00 Solenoid, shut-off (PM902)
X-35347-26-0 Holder Ass'y, solenoid
3-492-255-00 Shield, transistor
Transistor, 2SC867 (Q901)
Lug, 4
2-825-006-00 Spacer, mylar
2-832-004-00 Bushing, insulator; G-1
X-35347-22-0 Slide Ass'y, fast forward
3-492-239-00 Spring
X-35347-18-0 Lever Ass'y, fast forward function
3-534-803-00 Reinforcement
3-492-224-00 Bracket, capstan shaft
attached to power transformer (P 4x40)
1-441-249-11 (USA)
1-442-258-00 (E)
Transformer, power (T901)
3-534-841-00 Collar, function lever
3-534-807-00 Chassis (R), side
3-534-887-00 Cover, push switch
3-531-576-11 Rivet, nylon
Complete Circuit Board, bias osc (A)
attached to power transformer (N 3, SW 3, W 3)
3-510-054-00 Heat Sink
W 3, w/ext tooth
N 3
3-534-838-00 Lever (B), limiter release
3-492-261-01 Washer, 5; polyethylene (t=0.25)
3-534-830-00 Bracket, micro switch
3-534-804-00 Heat Sink
3-429-902-00 Insulator; fiber
1-514-039-12 Switch, micro; motor (S906)
3-534-787-00 Bracket, worm wheel
X-35347-27-0 Chassis Ass'y, direction
3-534-773-00 Lever, direction
3-701-441-11 Washer, 4; polyethylene (t=0.25)
X-35347-28-0 Arm Ass'y, drum
1-516-383-11 Switch, micro; head rotation detector (S901, 902)
P 3x12
P 2x10
3-437-352-00 Spring
3-534-928-00 Lever, micro switch
3-534-775-00 Bushing
3-534-774-00 Spring
3-534-789-00 Spring
3-534-784-00 Plate (R), micro switch adjusting
3-534-772-00 Plate, thrust
3-534-771-00 Spring, cone
3-534-785-00 Plate (L), micro switch adjusting
3-534-828-00 Lever, release
3-534-835-00 Lever (C), release
3-534-839-00 Roller, slide
3-534-836-00 Lever (D), release
3-534-768-00 Felt, friction
3-534-761-00 Hook, spring
3-534-769-00 Wheel
3-534-767-00 Wheel, worm
3-534-914-00 Shield, motor
8-832-624-24 Motor, IC-624G (M901)
3-534-770-00 Shaft, worm wheel
X-35347-29-0 Hook Ass'y, spring
3-534-786-00 Roller, cam
3-500-098-00 Pin, solenoid plunger
1-454-096-00 Solenoid, shut-off (PM902)
X-35347-26-0 Holder Ass'y, solenoid
3-492-255-00 Shield, transistor
Transistor, 2SC867 (Q901)
Lug, 4
2-825-006-00 Spacer, mylar
2-832-004-00 Bushing, insulator; G-1
X-35347-22-0 Slide Ass'y, fast forward
3-492-239-00 Spring
X-35347-18-0 Lever Ass'y, fast forward function
3-534-803-00 Reinforcement
3-492-224-00 Bracket, capstan shaft
attached to power transformer (P 4x40)
1-441-249-11 (USA)
1-442-258-00 (E)
Transformer, power (T901)
3-534-841-00 Collar, function lever
3-534-807-00 Chassis (R), side
3-534-887-00 Cover, push switch
3-531-576-11 Rivet, nylon
Complete Circuit Board, bias osc (A)
attached to power transformer (N 3, SW 3, W 3)
3-510-054-00 Heat Sink
W 3, w/ext tooth
N 3
3-534-838-00 Lever (B), limiter release
3-492-261-01 Washer, 5; polyethylene (t=0.25)
3-534-830-00 Bracket, micro switch
3-534-804-00 Heat Sink
3-429-902-00 Insulator; fiber
1-514-039-12 Switch, micro; motor (S906)
3-534-787-00 Bracket, worm wheel
X-35347-27-0 Chassis Ass'y, direction
3-534-773-00 Lever, direction
3-701-441-11 Washer, 4; polyethylene (t=0.25)
X-35347-28-0 Arm Ass'y, drum
1-516-383-11 Switch, micro; head rotation detector (S901, 902)
P 3x12
P 2x10
3-437-352-00 Spring
3-534-928-00 Lever, micro switch
3-534-775-00 Bushing
3-534-774-00 Spring
3-534-789-00 Spring
3-534-784-00 Plate (R), micro switch adjusting
3-534-772-00 Plate, thrust
3-534-771-00 Spring, cone
3-534-785-00 Plate (L), micro switch adjusting
3-534-828-00 Lever, release
3-534-835-00 Lever (C), release
3-534-839-00 Roller, slide
3-534-836-00 Lever (D), release
3-534-768-00 Felt, friction
3-534-761-00 Hook, spring
3-534-769-00 Wheel
3-534-767-00 Wheel, worm
3-534-914-00 Shield, motor
8-832-624-24 Motor, IC-624G (M901)
3-534-770-00 Shaft, worm wheel
X-35347-29-0 Hook Ass'y, spring
3-534-786-00 Roller, cam
3-500-098-00 Pin, solenoid plunger
1-454-096-00 Solenoid, shut-off (PM902)
X-35347-26-0 Holder Ass'y, solenoid
3-492-255-00 Shield, transistor
Transistor, 2SC867 (Q901)
Lug, 4
2-825-006-00 Spacer, mylar
2-832-004-00 Bushing, insulator; G-1
X-35347-22-0 Slide Ass'y, fast forward
3-492-239-00 Spring
X-35347-18-0 Lever Ass'y, fast forward function
3-534-803-00 Reinforcement
3-492-224-00 Bracket, capstan shaft
attached to power transformer (P 4x40)
1-441-249-11 (USA)
1-442-258-00 (E)
Transformer, power (T901)
3-534-841-00 Collar, function lever
3-534-807-00 Chassis (R), side
3-534-887-00 Cover, push switch
3-531-576-11 Rivet, nylon
Complete Circuit Board, bias osc (A)
attached to power transformer (N 3, SW 3, W 3)
3-510-054-00 Heat Sink
W 3, w/ext tooth
N 3
3-492-261-01 Washer, 5; polyethylene (t=0.25)
3-534-838-00 Lever (B), limiter release


Y-35350-01-0
HBU-315 Unit Ass'y, head base; complete; including parts marked ▲ 1~60
▲ 19 3-430-232-00 Cap, pinch roller
▲ 16 3-425-197-01 Washer, thrust (t=0.13)
▲ 20 3-430-234-11 Washer, pinch roller
▲ 21 3-430-235-00 Washer, pinch roller
▲ 18 3-430-231-00 Ring, oil absorber
▲ 15 3-409-163-00 Washer, idler thrust
▲ 30 3-493-855-00 Pinch Roller
▲ 42 3-535-014-00 Guide (B), tape
▲ 43 3-535-015-00 Guide (C), tape
▲ 41 3-535-013-00 Guide (R), tape
▲ 31 3-493-860-00 Guide (AR), tape
▲ 40 3-535-012-00 Guide (AL), tape
▲ 34 3-493-879-00 Guide (L), tape
▲ 32 3-493-871-00 Spring
▲ 17 3-425-197-11 Washer, thrust (t=0.25)
▲ 53 7-612-042-30 Wire, vinyl; black
▲ 54 7-612-042-31 Wire, vinyl; brown
▲ 55 7-612-042-32 Wire, vinyl; red
▲ 56 7-612-042-33 Wire, vinyl; orange
▲ 57 7-612-042-34 Wire, vinyl; yellow
▲ 4 X-34938-09-0 Lever (LR) Ass'y, pinch roller
▲ 3 X-34938-05-0 Lever (L) Ass'y, shifter
▲ 11 X-35350-07-0 Lever (L2) Ass'y, pinch roller
▲ 12 X-35350-08-0 Lever (R2) Ass'y, pinch roller
▲ 38 3-535-010-00 Lever (R1), pinch roller pressure
▲ 2 X-34938-04-0 Lever (R) Ass'y, shifter
▲ 10 X-35350-06-0 Lever (L2) Ass'y, pinch roller pressure
▲ 6 X-35350-02-0 Hook Ass'y, spring
▲ 9 X-35350-05-0 Lever (R2) Ass'y, pinch roller pressure
▲ 13 X-35350-09-0 5-61 Lever (A) Ass'y, pressure
▲ 7 X-35350-03-0 Deck (R) Ass'y, erase head
▲ 8 X-35350-04-0 Deck (L) Ass'y, erase head
▲ 5 X-35350-01-0 Deck Ass'y, head
▲ 14 X-35350-10-0 Unit Ass'y, ferrite head; including parts marked ★ 1~9
△ 1 3-493-830-00 Washer, thrust
▲ 1 X-34938-02-0 Flywheel Ass'y, including part marked △ 1
▲ 26 3-493-849-00 Washer (A), head rotation shaft
▲ 25 3-493-848-00 Collar, head rotation shaft
▲ 33 3-493-877-00 Felt, flywheel
1-582-772-00 Printed Circuit Board, erase head
▲ 60 8-825-547-00 Head, erase; EF18-2902A2 (EH901, 902)
★ 3 3-493-843-00 Screw (A), head adjusting
▲ 59 7-683-238-31 Set Screw, 3 x 4 w/hexagon socket
▲ 45 3-535-017-00 Flange (A), tape guide
▲ 44 3-535-016-00 Pole, sensing
★ 6 3-493-872-00 Spring, head adjusting
▲ 46 3-535-018-00 Flange (B), tape guide
▲ 48 3-535-020-00 Lug
▲ 47 3-535-019-00 Collar
▲ 32 3-493-871-00 Spring
▲ 29 3-493-854-00 Deck, erase head
▲ 36 3-493-882-00 Retainer (B), head wire
▲ 35 3-493-881-00 Retainer (A), head wire
▲ 37 3-534-138-00 Retainer, record circuit board
1-582-594-11 Printed Circuit Board, terminal
▲ 51 3-535-023-00 Roller, gear
▲ 52 3-535-025-00 Gear, sector
▲ 28 3-493-851-00 Gear, small
▲ 22 3-454-051-00 Ring, oil absorber
▲ 23 3-493-846-00 Screw, spring adjustment
▲ 24 3-493-847-00 Spring, plate
▲ 27 3-493-850-00 Washer (B), head rotation shaft
3-534-816-00 Support, head cover
3-534-844-00 Shield (A), head
★ 1 3-493-841-00 Shield, head
★ 9 8-825-534-00 Head, playback; PF140-4202
★ 8 8-825-511-00 Head, record; RF140-2902
★ 2 3-493-842-00 Plate (A), head adjusting
★ 7 3-493-875-00 Clamp, head wire
★ 5 3-493-845-00 Cover, head
★ 4 3-493-844-00 Screw (B), head adjusting
★ 5 3-493-845-00 Bracket, erase head
3-534-816-00 Support, head cover
3-535-022-00 Spring
3-534-138-00 Retainer, record circuit board
P 3x6, self-tapping
P 2.6x8
P 2x4
P 2x2
P 3x12
PS 3x4
PS 3x12
W 2.6
T 2x4
P 2 x 4
(–) SC 3x6
(–) SC 2.6x8
PSW 3x6
E 2
E 3
E 4
157
187

Note: 1. Parts without part numbers and names are not available.

2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head

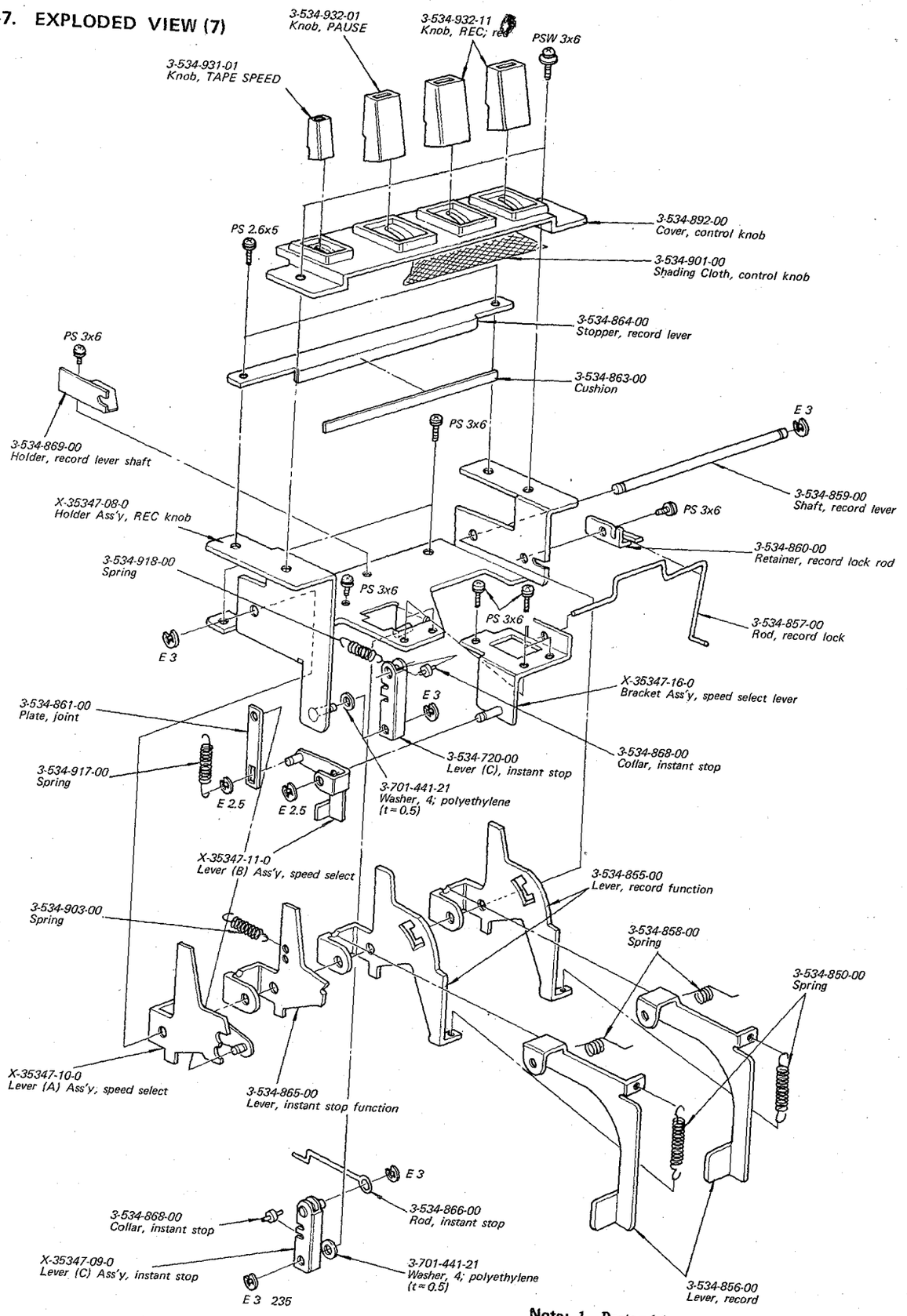
5-6. EXPLODED VIEW (6)



Note: 1. Parts without part numbers and names are not available.

2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head

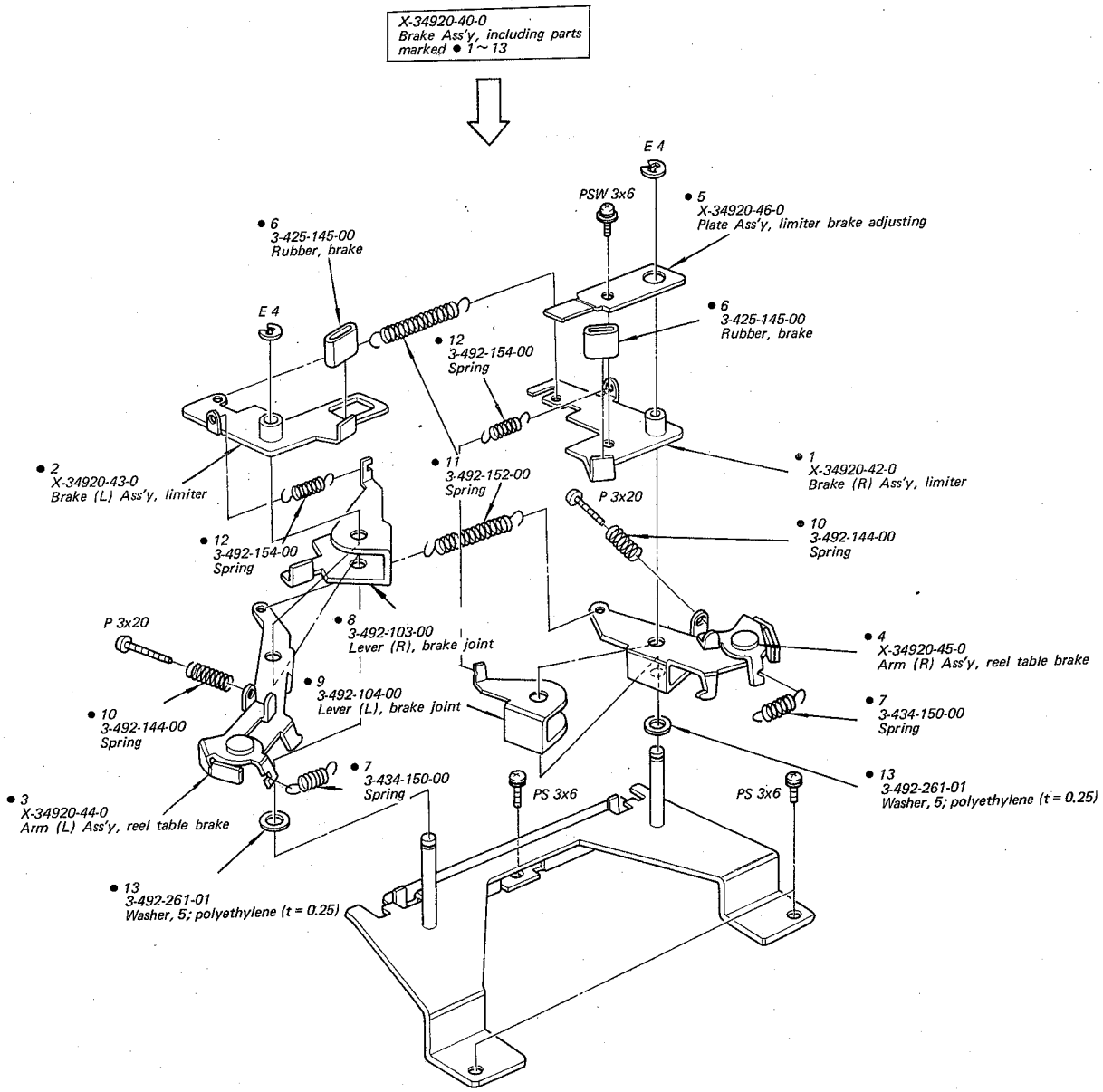
5-7. EXPLODED VIEW (7)



Note: 1. Parts without part numbers and names are not available.

2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head

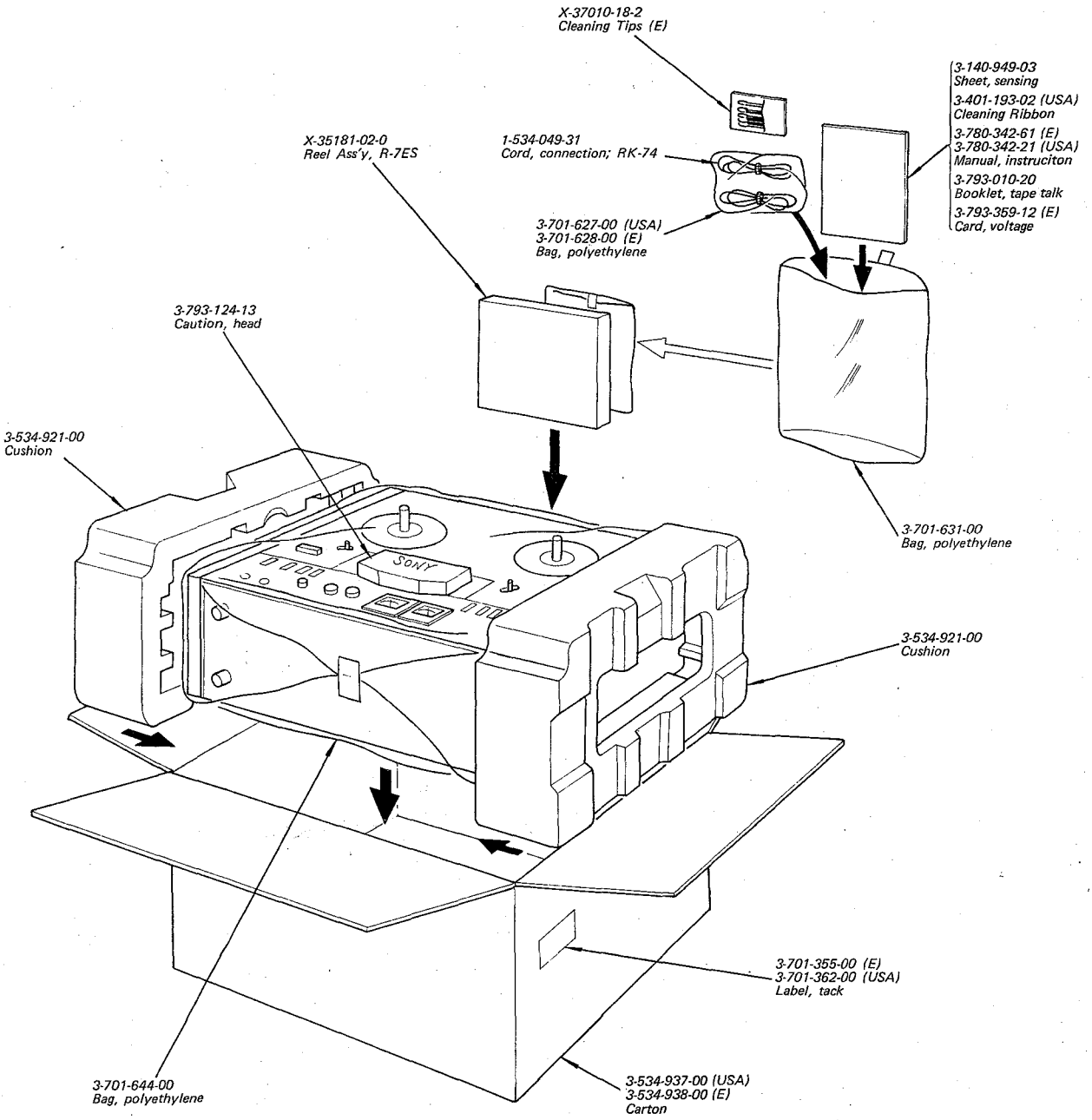
5-8. EXPLODED VIEW (8)



Note: 1. Parts without part numbers and names are not available.

2. All screws are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head

5-9. PACKING



Note: Parts without part numbers and names are not available.

SECTION 6

ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
		COMPLETE CIRCUIT BOARDS
	X-3534-745-1	Control Switch
	X-3534-746-1	System Control (2)
	X-3534-747-1	MONITOR Switch
	X-3534-748-1	Bias Adj
	X-3534-749-1	Servo Control
	X-3534-750-1	Bias Osc
	X-3534-751-1	Playback Amp
	X-3534-752-1	System Control (1)
	X-3534-753-1	Jack (E)
	X-3534-754-1	Jack (USA)
	X-3534-755-1	Record Amp (USA)
	X-3534-756-1	Record Amp (E)
		PRINTED CIRCUIT BOARDS
	1-582-594-11	Terminal
	1-582-686-11	Pilot Lamp
	1-582-772-11	Erase Head (USA)
		SEMICONDUCTORS
Q1		Transistor 2SC634A
Q2		Transistor 2SC634A
Q3		Transistor 2SC634A
Q4		Transistor 2SC634A
Q5		Transistor 2SC634A
Q6		Transistor 2SC634A
Q7		Transistor 2SC634A
Q8		Transistor 2SC634A
Q9		Transistor 2SC1475
Q10		Transistor 2SC634A
Q11		Transistor 2SC1475
Q12		Transistor 2SC634A
Q13		Transistor 2SC1061
Q14		Transistor 2SC634A
Q15		Transistor 2SC1061
Q16		Transistor 2SC634A
Q101, 201		Transistor 2SC631A
Q102, 202		Transistor 2SC631A
Q103, 203		Transistor 2SC633A
Q104, 204		Transistor 2SC1363
Q105, 205		Transistor 2SC1364
Q106, 206		Transistor 2SC634A
Q107, 207		Transistor 2SC634A
Q108, 208		Transistor 2SC634A
Q109, 209		Transistor 2SC634A
Q301		Transistor 2SA678
Q401, 501		Transistor 2SK43
Q402, 502		Transistor 2SC631A
Q403, 503		Transistor 2SC634A
Q404, 504		Transistor 2SC633A
Q405, 505		Transistor 2SC1364
Q406, 506		Transistor 2SC1364
Q601		Transistor 2SC634A
Q602		Transistor 2SC634A
Q603		Transistor 2SC634A
Q604		Transistor 2SC1061
Q605		Transistor 2SD291
Q606		Transistor 2SC634A
Q607		Transistor 2SC634A
Q608		Transistor 2SC1364
Q901		Transistor 2SC867
IC651		Integrated Circuit CX-032B
D1		Diode 1T40
D2		Diode 1T40
D3		Diode 1T40
D4		Diode 1T40
D5		Diode 1T40
D6		Diode 1T40
D7		Diode SIB01-02
D8		Diode SIB01-02
D9		Diode 1T40
D10		Diode SIB01-02

Ref. No.	Part No.	Description	
D11		Diode	SIB01-02
D12		Diode	SIB01-02
D13		Diode	SIB01-02
D14		Diode	1T22
D301		Diode	SIB01-02
D401, 501		Diode	1T22
D601		Diode	1T40
D602		Diode	1T40
D603		Diode	SIB01-02
D604		Diode	SIB01-02
D605		Diode	SIB01-02
D606		Diode	MZ-08
D607		Diode	SIB01-02
D608		Diode	SIB01-02
D609		Diode	SIB01-02
D610		Diode	SIB01-02
D611		Diode	1T40
D612		----------	
D613		----------	
D614		----------	
D615		----------	
D616		Diode	SIB01-02
D617		Diode	SIB01-02
D618		Diode	SIB01-02
D619		Diode	1T40
D620		Diode	SIB01-02
D651		Diode	SIB01-02
D652		Diode	SIB01-02
D653		Diode	SIB01-02
D654		Diode	SIB01-02
D655		Diode	SIB01-02

COILS

Ref. No.	Part No.	Description
L101, 201	1-407-519-11	8 μH, inductor
L102, 202	1-407-286-11	2.2 mH, variable inductor
L103, 203	1-407-496-21	2.2 mH, microinductor
L104, 204	1-407-493-21	1.2 mH, microinductor
L301	1-407-284-11	1 mH, variable inductor
L302	1-407-284-11	1 mH, variable inductor
L303	1-407-284-11	1 mH, variable inductor
L304	1-207-284-11	1 mH, variable inductor
L401, 501	1-407-593-11	27 mH, microinductor

TRANSFORMERS

Ref. No.	Part No.	Description
T401, 501	1-427-299-11	Headphone
T901	1-441-249-11	Power (USA)
	1-442-258-00	Power (E)

CAPACITORS

All capacitors are in μF unless otherwise indicated. (p = μμ, elect = electrolytic)

C1	1-121-391-11	1	50 V	elect
C2	1-121-396-11	4.7	50 V	elect
C3	1-121-413-11	100	6.3 V	elect
C4	1-131-213-11	0.47	35 V	solid tantalum
C5	1-121-398-11	10	25 V	elect
C6	1-121-391-11	1	50 V	elect
C7	1-131-187-11	100	3.15 V	solid tantalum
C8	1-131-239-11	6.8	35 V	solid tantalum
C9	1-121-726-11	0.47	50 V	elect
C10	1-121-391-11	1	50 V	elect
C11	1-121-657-11	1000	25 V	elect
C12	1-121-404-11	33	25 V	elect
C13	1-105-683-12	0.068	50 V	mylar
C101, 201	1-121-409-11	47	16 V	elect
C102, 202	1-131-236-11	1	25 V	solid tantalum
C103, 203	1-105-661-12	0.001	50 V	mylar
C104, 204	1-121-413-11	100	6.3 V	elect
C105, 205	1-107-125-11	56 p	50 V	silvered mica
C106, 206	1-121-420-11	220	10 V	elect
C107, 207	1-121-398-11	10	25 V	elect
C108, 208	1-121-398-11	10	25 V	elect
C109, 209	1-121-410-11	47	25 V	elect
C110, 210	1-107-135-11	150 p	50 V	silvered mica

Ref. No.	Part No.	Description		
C111, 211	1-121-413-11	100	6.3 V	elect
C112, 212	1-107-125-11	56 p	50 V	silvered mica
C113, 213	1-121-398-11	10	25 V	elect
C114, 214	1-121-420-11	220	10 V	elect
C115, 215	1-105-684-12	0.082	50 V	mylar
C116, 216	1-121-726-11	0.47	50 V	elect
C117, 217	1-121-357-11	100	35 V	elect
C118, 218	1-121-398-11	10	25 V	elect
C119, 219	1-121-652-11	33	35 V	elect
C120, 220	1-121-398-11	10	25 V	elect
C121, 221	1-105-517-12	0.022	50 V	mylar
C122, 222	1-105-521-12	0.047	50 V	mylar
C123, 223	1-105-516-12	0.018	50 V	mylar
C124, 224	1-105-519-12	0.033	50 V	mylar
C125, 225	1-121-357-11	100	35 V	elect
C126, 226	1-107-183-11	390 p	500 V	silvered mica
C301	1-129-702-11	1000 p	630 V	polypropylene
C302	1-141-010-02	30 p ~ 200 p		trimmer
C303	1-141-010-02	30 p ~ 200 p		trimmer
C304	1-141-155-11	200 p ~ 600 p		trimmer
C305	1-107-185-11	470 p	500 V	silvered mica
C306	1-107-179-11	270 p	500 V	silvered mica
C307	1-107-187-11	560 p	500 V	silvered mica
C308	1-121-450-11	2.2	50 V	elect
C401, 501	1-121-422-11	220	25 V	elect
C402, 502	1-123-055-11	47	16 V	elect
C403, 503	1-105-661-11	0.001	50 V	mylar
C404, 504	1-107-135-11	150 p	50 V	silvered mica
C405, 505	1-121-415-11	100	16 V	elect
C406, 506	1-107-123-11	47 p	50 V	silvered mica
C407, 507	1-121-420-11	220	10 V	elect
C408, 408	1-121-398-11	10	25 V	elect
C409, 509	1-105-518-11	0.027	50 V	mylar
C410, 510	1-121-357-11	100	35 V	elect
C411, 511	1-107-117-11	27 p	50 V	silvered mica
C412, 512	1-105-661-11	0.001	50 V	mylar
C413, 513	1-121-398-11	10	25 V	elect
C414, 514	1-121-391-11	1	50 V	elect
C415, 515	1-107-123-11	47 p	50 V	silvered mica

Ref. No.	Part No.	Description		
C416, 516	1-121-414-11	100	10 V	elect
C417, 517	1-121-398-11	10	25 V	elect
C418, 518	1-121-398-11	10	25 V	elect
C419, 519	1-121-357-11	100	35 V	elect
C420, 520	1-121-404-11	33	25 V	elect
C601	1-105-683-12	0.068	50 V	mylar
C602	1-121-726-11	0.47	50 V	elect
C603	1-105-669-12	0.001	50 V	mylar
C604	1-121-392-11	3.3	25 V	elect
C605	1-121-392-11	3.3	25 V	elect
C606	1-121-410-11	47	25 V	elect
C607	1-105-683-12	0.068	50 V	mylar
C608	1-121-726-11	0.47	50 V	elect
C609	1-105-681-12	0.047	50 V	mylar
C610	1-105-679-12	0.033	50 V	mylar
C611	1-121-398-11	10	50 V	elect
C612	1-121-416-11	100	25 V	elect
C613	1-121-388-11	1000	35 V	elect
C614	1-121-361-11	470	35 V	elect
C615	1-105-669-12	0.001	50 V	mylar
C616	1-121-652-11	33	35 V	elect
C617	1-121-810-11	470	50 V	elect
C618	1-121-395-11	4.7	25 V	elect
C619	1-117-064-11	0.5	350 V	metalized paper
C651	1-105-683-12	0.068	50 V	mylar
C652	1-105-677-11	0.022	50 V	mylar
C653	1-121-416-11	100	25 V	elect
C654	1-121-398-11	10	25 V	elect
C655	1-108-550-11	0.082	50 V	mylar
C656	1-105-661-12	0.001	50 V	mylar
C657	1-121-398-11	10	25 V	elect
C658	1-131-199-11	10	16 V	solid tantalum
C659	1-131-197-11	3.3	16 V	solid tantalum
C660	1-121-409-11	47	16 V	elect
C661	1-121-900-11	4.7	250 V	elect
C662		----------		
C663	1-105-683-12	0.068	50 V	mylar
C801	1-105-689-12	0.22	50 V	mylar

Ref. No.	Part No.	Description		
C802	1-105-689-12	0.22	50 V	mylar
C901	1-117-036-22	1.5 + 0.5	250 V	metalized paper
C902		----------		
C903	1-105-679-12	0.033	50 V	mylar
C904	1-105-679-12	0.033	50 V	mylar
C905	1-107-131-11	100 p	50 V	silvered mica
C906	1-107-131-11	100 p	50 V	silvered mica

RESISTORS

All resistors are ¼ W, carbon type, and in Ω unless otherwise indicated. (k = 1000)

R1	1-242-725-11	150 k		
R2	1-242-713-11	47 k		
R3	1-242-691-11	5.6 k		
R4	1-242-673-11	1 k		
R5	1-242-673-11	1 k		
R6	1-242-705-11	22 k		
R7	1-242-705-11	22 k		
R8	1-242-715-11	56 k		
R9	1-242-715-11	56 k		
R10	1-242-705-11	22 k		
R11	1-242-697-11	10 k		
R12	1-242-681-11	2.2 k		
R13	1-242-717-11	68 k		
R14	1-242-723-11	120 k		
R15	1-242-699-11	12 k		
R16	1-242-707-11	27 k		
R17	1-242-679-11	1.8 k		
R18	1-242-689-11	4.7 k		
R19	1-242-683-11	2.7 k		
R20	1-242-721-11	100 k		
R21	1-242-649-11	100		
R22	1-242-697-11	10 k		
R23	1-242-705-11	22 k		
R24	1-242-705-11	22 k		
R25	1-242-691-11	5.6		
R26	1-242-697-11	10 k		
R27	1-242-689-11	4.7 k		

Ref. No.	Part No.	Description		
R28	1-242-689-11	4.7 k		
R29	1-242-707-11	27 k		
R30	1-242-707-11	27 k		
R31	1-242-705-11	22 k		
R32	1-242-705-11	22 k		
R33	1-242-705-11	22 k		
R34	1-242-705-11	22 k		
R35	1-206-652-11	330	2 W	metal oxide
R36	1-217-364-11	10	10 W	metal oxide
R37	1-242-669-11	680		
R38	1-242-705-11	22 k		
R39	1-242-706-11	24 k		
R40	1-242-673-11	1 k		
R41	1-242-687-11	10 k		
R101, 201	1-242-681-11	2.2 k (USA)		
	1-242-687-09	3.9 k (E)		low noise
R102, 202	1-242-687-11	3.9 k		
R103, 203	1-242-671-11	820		
R104, 204	1-242-653-11	150		
R105, 205	1-242-719-11	82 k		
R106, 206	1-224-322-11	100 k (A), variable; REC VOL LINE		
R107, 207	1-242-709-11	33 k		
R108, 208	1-242-721-09	100 k		low noise
R109, 209	1-242-701-09	15 k		low noise
R110, 210		----------		
R111, 211	1-242-687-09	3.9 k		low noise
R112, 212	1-242-719-09	82 k		low noise
R113, 213	1-242-659-11	270		
R114, 214	1-242-717-71	68 k		low noise
R115, 215	1-242-713-11	47 k		
R116, 216	1-242-681-11	2.2 k		
R117, 217	1-242-669-11	680		
R118, 218	1-242-703-11	18 k		
R119, 219	1-224-323-11	20 k (A), variable; REC VOL MIC		
R120, 220	1-242-705-11	22 k		
R121, 221	1-242-731-11	270 k		
R122, 222	1-242-703-11	18 k		
R123, 223	1-242-713-11	47 k		
R124, 224	1-242-721-11	100 k		

Ref. No.	Part No.	Description		
R125, 225	1-242-675-11	1.2 k		
R126, 226	1-242-673-11	1 k		
R127, 227	1-242-707-11	27 k		
R128, 228	1-242-659-11	270		
R129, 229	1-242-679-11	1.8 k		
R130, 230	1-242-667-11	560		
R131, 231	1-242-709-11	33 k		
R132, 232	1-242-703-11	18 k		
R133, 233	1-242-683-11	2.7 k		
R134, 234	1-222-774-11	10 k (B)		adjustable
R135, 235	1-242-731-11	270 k		
R136, 236	1-242-725-11	150 k		
R137, 237	1-242-713-11	47 k		
R138, 238	1-242-689-11	4.7 k		
R139, 239	1-242-681-11	2.2 k		
R140, 240	1-242-673-11	1 k		
R141, 241	1-242-637-11	33		
R142, 242	1-242-639-11	39		
R143, 243	1-242-697-11	10 k		
R144, 244	1-242-697-11	10 k		
R145, 245	1-242-697-11	10 k		
R146, 246	1-242-697-11	10 k		
R147, 247		----------		
R148, 248		----------		
R149, 249		----------		
R150, 250		----------		
R151, 251	1-242-705-11	22 k		
R152, 252	1-242-705-11	22 k		
R153, 253	1-242-705-11	22 k		
R154, 254	1-242-705-11	22 k		
R301	1-244-847-11	82	½ W	
R302	1-242-617-11	4.7		
R303	1-242-617-11	4.7		
R304	1-242-693-11	6.8 k		
R305	1-206-656-11	470	2 W	metal oxide
R306	1-242-715-11	56 k		
R401, 501	1-242-707-09	27 k		low noise
R402, 502	1-242-729-09	220 k		low noise

Ref. No.	Part No.	Description		
R403, 503	1-242-721-09	100 k		low noise
R404, 504	1-242-693-09	6.8 k		low noise
R405, 505	1-242-681-11	2.2 k		
R406, 506	1-242-647-11	82		
R407, 507	1-242-689-11	4.7 k		
R408, 508	1-242-691-11	5.6 k		
R409, 509	1-242-689-11	4.7 k		
R410, 510	1-242-721-11	100 k		
R411, 511	1-222-773-11	4.7 k (B)		adjustable
R412, 512	1-242-681-11	2.2 k		
R413, 513	1-242-675-11	1.2 k		
R414, 514	1-222-774-11	10 k (B)		adjustable
R415, 515	1-242-695-11	8.2 k		
R416, 516	1-242-727-11	180 k		
R417, 517	1-242-699-11	12 k		
R418, 518	1-242-713-11	47 k		
R419, 519	1-242-675-11	1.2 k		
R420, 520	1-242-731-11	270 k		
R421, 521	1-242-711-11	39 k		
R422, 522	1-242-677-11	1.5 k		
R423, 523	1-242-665-11	470		
R424, 524	1-242-709-11	33 k		
R425, 525	1-242-695-11	8.2 k		
R426, 526	1-244-879-11	1.8 k	½ W	
R427, 527	1-222-773-11	4.7 k (B)		adjustable
R428, 528	1-242-673-11	1 k		
R429, 529	1-224-324-11	10 k (B), variable; LINE OUT VOL		
R430, 530	1-242-681-11	2.2 k		
R431, 531	1-242-729-11	220 k		
R432, 532	1-242-727-11	180 k		
R433, 533		----------		
R434, 534	1-242-649-11	100		
R601	1-242-689-11	4.7 k		
R602	1-242-691-11	5.6 k		
R603	1-242-680-11	2 k		
R604	1-242-688-11	4.3 k		
R605	1-242-739-11	560 k		

Ref. No.	Part No.	Description		
R606	1-242-689-11	4.7 k		
R607	1-242-697-11	10 k		
R608	1-242-705-11	22 k		
R609	1-242-689-11	4.7 k		
R610	1-242-705-11	22 k		
R611	1-242-689-11	4.7 k		
R612	1-242-697-11	10 k		
R613	1-242-689-11	4.7 k		
R614	1-242-681-11	2.2 k		
R615	1-242-680-11	2 k		
R616	1-242-739-11	560 k		
R617	1-242-688-11	4.3 k		
R618	1-242-689-11	4.7 k		
R619	1-242-691-11	5.6 k		
R620	1-242-707-11	27 k		
R621	1-242-737-11	470 k		
R622	1-242-725-11	150 k		
R623	1-242-725-11	150 k		
R624	1-242-735-11	390 k		
R625	1-242-699-11	12 k		
R626	1-242-733-11	330 k		
R627	1-242-705-11	22 k		
R628	1-242-681-11	2.2 k		
R629	1-242-639-11	39		
R630	1-242-649-11	100		
R631	1-244-841-11	47	½ W	
R632	1-242-719-11	82 k		
R633	1-222-777-11	100 k (B)		adjustable
R634	1-242-697-11	10 k		
R635	1-242-673-11	1 k		
R636	1-242-709-11	33 k		
R637	1-242-705-11	22 k		
R638	1-242-681-11	2.2 k		
R639	1-242-697-11	10 k		
R640	1-244-851-11	120	½ W	
R641	1-242-697-11	10 k		
R642	1-242-697-11	10 k		
R643	1-242-697-11	10 k		
R644	1-242-721-11	100 k		

Ref. No.	Part No.	Description		
R645	1-206-656-11	470	2 W	metal oxide
R646	1-217-375-11	1		fuse
R647		----------		
R648		----------		
R649		----------		
R650		----------		
R651	1-242-667-11	560		
R652		----------		
R653	1-244-867-11	560	½ W	
R654	1-242-625-11	10		
R655	1-242-687-11	3.9 k		
R656	1-242-709-11	33 k		
R657	1-242-699-11	12 k		
R658	1-242-705-11	22 k		
R659	1-242-677-11	1.5 k		
R660	1-242-701-11	15 k		
R661	1-242-693-11	6.8 k		
R662	1-206-153-11	470	3 W	metal oxide
R663	1-244-801-11	1	½ W	
R664	1-242-675-11	1.2 k		
R665	1-222-774-11	10 k (B)		adjustable
R666	1-242-712-11	43 k		
R667	1-222-774-11	10 k (B)		adjustable
R668	1-242-712-11	43 k		

SWITCHES

S101	1-516-365-11	Rotary Slide, MIC ATT
S102	1-516-367-11	Slide, TAPE SELECT
S301	1-514-978-21	Slide, record/playback
S302	1-514-978-21	Slide, record/playback
S303	1-514-976-21	Slide, TAPE SPEED
S701	1-516-366-11	Lever Slide, MONITOR
S702	1-516-366-11	Lever Slide, MONITOR
S801	1-516-309-11	Micro, reverse
S802	1-516-309-11	Micro, servo control power
S803	1-516-309-11	Micro, servo control release
S804	1-516-309-11	Micro, sensing pole

Ref. No.	Part No.	Description
S805	1-516-309-11	Micro, playback
S901	1-516-383-11	Micro, head rotation detector
S902	1-516-383-11	Micro, head rotation detector
S903	1-514-730-12	Micro, shut-off
S904	1-516-383-11	Micro, bias osc muting
S905	1-516-181-11	Push, POWER
S906	1-514-039-12	Micro, motor
	JACKS	
J901	1-507-376-11	Phone, MIC
J902	1-507-376-11	Phone, MIC
J903	1-507-414-11	Binaural, HEADPHONE
CNJ901	1-507-402-11	4 p, phono; LINE IN/LINE OUT (USA)
	1-507-403-11	4 p, phono; LINE IN/LINE OUT (E)
CNJ902	1-509-549-00	Connector, REC/PB (E)
VS901	1-509-427-00	Socket, voltage selector (E)
	MISCELLANEOUS	
CP301	1-464-029-11	Bias osc unit
CP601	1-231-057-31	Encapsulated Component, C-R; 0.033 μF + 120 Ω
CP801	1-101-534-31	Encapsulated Component, C-R; 0.1 μF + 120 Ω
CP802	1-101-534-31	Encapsulated Component, C-R; 0.1 μF + 120 Ω

Ref. No.	Part No.	Description
CP901	1-101-534-31	Encapsulated Component, C-R; 0.1 μF + 120 Ω
CP902	1-101-534-31	Encapsulated Component, C-R; 0.1 μF + 120 Ω
F901	1-532-135-00	Fuse, 1.0 A
M901	8-832-624-21	Motor, IC-624G
ME901	1-520-170-11	Meter, VU; including PL901
ME902	1-520-170-11	Meter, VU; including PL902
PL901		Included in ME901
PL902		Included in ME902
PL903	1-518-134-11	Lamp, 2 V 100 mA
PL904	1-518-134-11	Lamp, 2 V 100 mA
PM901	1-454-113-21	Solenoid, head rotation
PM902	1-454-096-11	Solenoid, shut-off
PM903	1-454-113-11	Solenoid, tension regulator release (L)
PM904	1-454-113-11	Solenoid, tension regulator release (R)
RY601	1-515-127-41	Relay, reverse
	1-533-102-00	Holder, fuse (E)
	1-535-506-21	Terminal, crimping
	1-931-159-11	Harness
	1-931-159-21	Harness
RH901~902	8-825-511-00	Head, record; RF140-2902
PH901~902	8-825-534-00	Head, playback; PF140-4202
EH901~904	8-825-547-00	Head, erase; EF18-2902A2
	1-534-526-21	Cord, power (E)
	1-534-551-22	Cord, power (USA)

SECTION 7
HARDWARE

Part No.	*Description*
	SCREWS
All screws are Phillips type (cross recess type) unless otherwise indicated. (–): slotted head.	
7-621-255-24	P 2 x 4
7-621-259-36	P 2.6 x 5
7-621-259-42	P 2.6 x 6
7-621-259-55	P 2.6 x 8
7-621-281-15	P 2 x 2
7-621-455-25	T 2 x 4
7-621-712-51	(–) SC 2.6 x 6, cone point
7-621-712-52	(–) SC 2.6 x 6, flat point
7-621-712-61	(–) SC 2.6 x 8, cone point
7-621-712-62	(–) SC 2.6 x 8, flat point
7-621-771-31	B 2.6 x 4
7-682-126-01	P 2 x 6
7-682-149-01	P 3 x 10
7-682-151-01	P 3 x 14
7-682-153-01	P 3 x 20
7-682-155-14	P 3 x 30
7-682-349-04	RK 3 x 10
7-682-373-04	RK 4 x 70
7-682-549-13	B 3 x 10
7-682-550-13	B 3 x 12
7-682-633-01	PS 2.5 x 4
7-682-646-01	PS 3 x 5
7-682-947-01	PSW 3 x 6
7-683-238-31	3 x 4, set w/hexagon socket
7-685-144-31	P 3 x 5, self-tapping
7-685-144-51	P 3 x 5, self-tapping
7-685-145-31	P 3 x 6, self-tapping
7-685-559-31	B 4 x 8, self-tapping
	WASHERS
7-623-105-02	2 (middle)
7-623-105-12	2
7-623-107-02	2.6 (small)
7-623-107-12	2.6 (middle)
7-623-108-02	3 (small)
7-623-108-12	3 (middle)
7-623-110-02	4
7-623-205-26	2, spring
7-623-207-22	2.6, spring
7-623-208-22	3, spring
7-623-208-27	3, spring
7-623-408-01	3, w/ext tooth
	RETAINING RINGS
7-624-104-01	E 2
7-624-106-01	E 3
7-624-108-01	E 4
	NUTS
7-622-108-02	3
7-622-408-11	2, speed
7-684-013-00	3
7-684-014-01	4
	LUGS
7-623-507-11	2.6, egg type
7-623-508-01	3
7-623-510-11	4
	VINYL WIRES
7-612-042-30	Black
7-612-042-31	Brown
7-612-042-32	Red
7-612-042-33	Orange
7-612-042-34	Yellow
7-613-054-48	Wire, shielded; 2-conductor
7-671-115-01	Steel Ball 5

— Hardware Nomenclature —

P – Pan Head Screw

PS – Pan Head Screw with Spring Washer

K – Flat Countersunk Head Screw

B – Binding Head Screw

RK – Oval Countersunk Head Screw

T – Truss Head Screw

R – Round Head Screw

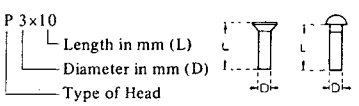
F – Flat Fillister Head Screw

SC – Set Screw

E – Retaining Ring (E Washer)

W – Washer
SW – Spring Washer
LW – Lock Washer
N – Nut

– Example –



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STEREO TAPECORDER

TC-458

UK Model
E Model
US Model

SUPPLEMENT

No. 1
DECEMBER, 1973

SUBJECT: CIRCUIT DESCRIPTION

1. Motor Circuit

The motor M901 rotates with power applied to the TC-458 and with either of the fast forward, forward, reverse or rewind lever pressed (motor switch S906 turns on). In the fast forward or rewind mode, the motor is directly connected to the power transformer through the servo-control-release microswitch S803 which is actuated only by pressing the fast forward or rewind lever. The direction of motor rotation is changed by the reverse relay RY601.

2. Ac Servo Control Circuit

The TC-458 uses the pulse-width type ac servo control circuit. The sine wave of 3 ~ 3.5 Vp-p FG (frequency generator) output is applied to pins (13) and (14) of IC651 and 7 Vp-p square wave is obtained at pin (1) through the internal flip-flop as shown in Fig. 1. C652 differentiates the square wave. The positive-going halves of the resultant pulse keys the internal switch. C655(CT) is charged by supply voltage through R665, R666, R667 and R668(RT). Across C652, leading portion of sawtooth wave is obtained. By discharging the sawtooth wave with the internal switch keyed by the above-mentioned positive pulse, 2 Vp-p sawtooth wave is obtained at pin (3). This sawtooth wave is applied to one end of the internal comparator. When the sawtooth wave reaches to the constant comparator voltage which is applied to pin (4), negative-going pulse is obtained from the comparator output and 4.8 Vp-p positive pulse is obtained at pin (11) through the internal inverter. The level of this pulse is constant and the pulse width varies in accordance with the tape speed.

Waveform relationship for tape speeds of 19 cm/s (7½ ips) and 9.5 cm/s(3¾ ips) are shown in Fig. 2. Output signal at pin (11) of IC651 passes through the hunching-preventing C-R filter and the dc component is amplified by Q901 and is applied to the motor circuit in series. When the motor speed lowers, signal to discharge C655 is not obtained and the sawtooth signal is not zeroed even when the sawtooth signal amplitude exceeds the comparator voltage, and broad-width pulse is obtained at pin (11) of IC651. Thus dc amp input increases and the motor speed increases.

3. Comparator Voltage and RT

The comparator voltage is constant at both speeds of 9.5 cm/s(3¾ ips) and 19 cm/s(7½ ips). If the comparator voltage becomes as high as two times, pulse rate becomes as long as two times and the motor speed reduces by half. When R656 and R657 are replaced, check the motor speed. Note should be taken not to check the motor speed with a volt-ohmmeter connected to pin (4) of IC651 for the comparator voltage measurement, otherwise the tape speed excessively lowers.

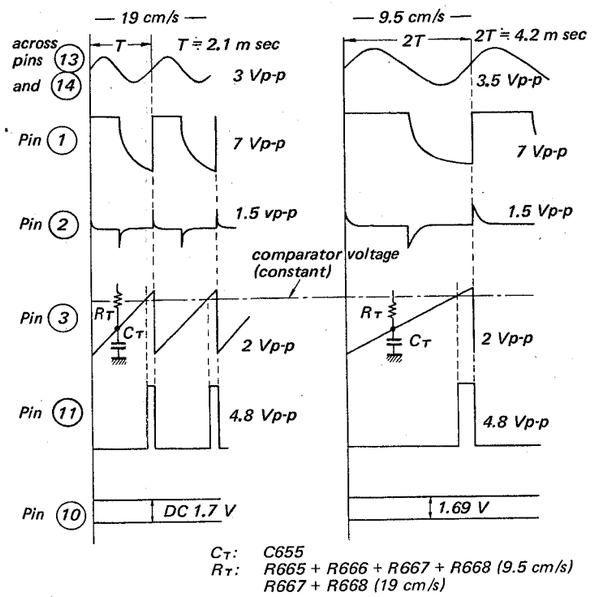

Fig. 2. Waveform relationship for tape speeds of 19 cm/s (7½ ips) and 9.5 cm/s (3¾ ips) at IC651 pins.

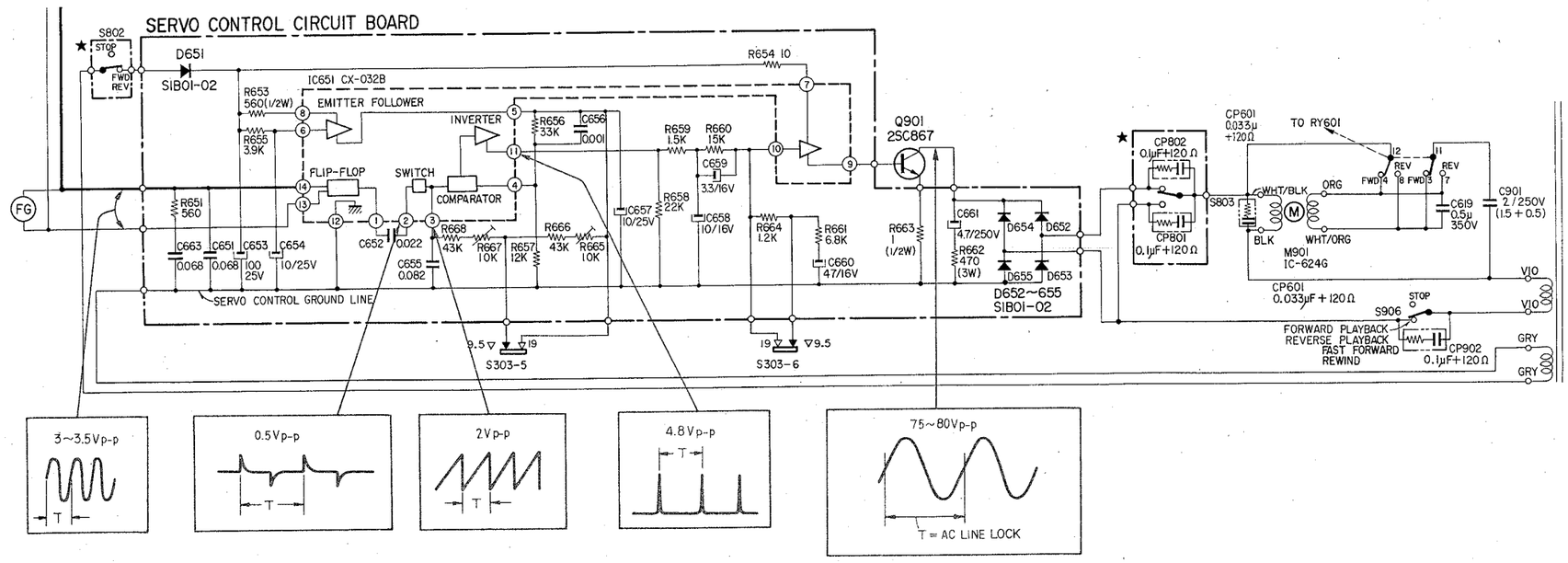

Fig. 1. Servo control circuit

SONY
SERVICE MANUAL

4. Forward Playback/Reverse Playback Changeover Circuit

In approximately one second after the POWER switch is turned to ON, the voltage regulator composed of Q605-Q607 in Fig. 3. generates +24 V DC voltage. When the tape is not set on the unit in the stop mode, the shut-off switch S903 is in the OFF state and Q604 is in the ON state, thus the shut-off solenoid PM902 is actuated and shut-off condition holds. In the shut-off condition, all function levers can not be locked. When the tape is normally threaded on the unit, the shut-off switch S903 turns to ON position and the shut-off solenoid PM902 releases. When PM902 releases, Q603 turns on and Q604 turns off, and the head rotation solenoid PM901 does not operate. In the forward playback and reverse playback modes, base bias of Q603 is obtained through the route composed of S804, R620, S901 (or S902) and R622 (or R623).

The flip-flop composed of Q601 and Q602 is used for forward playback/reverse playback changeover operation and it becomes in the stable state depending on the states of the head rotation detection switches S901 and S902 which are set by the mode, i.e., forward playback or reverse playback in which the unit has been stated before starting. When the set is in the forward playback mode, for example, bias voltage is applied to the base of Q603 through R620, S902 and R623. And Q603 is in the state of ON and Q604 is OFF. At the same time, the bias voltage triggers Q601 through S902, D602, R610 and R609.

When the forward playback lever is pressed, the forward playback switch S805 turns on and the negative signal is applied to the base of Q602, and the motor switch S906 turns to the forward playback position. When the reverse playback lever is pressed or the left-side sensing pole for the forward playback sensing is short-circuited, negative signal triggers the base of Q601 by the operation of the reverse switch S801 or sensing pole, thus Q601 turns off and Q602 turns on. As the results, Q608 turns on, the reverse relay RY601 turns to the reverse position and the motor starts to rotate reversely.

On the other hand, Q603 is in the OFF state and Q604 is in the ON state due to the conduction of D602 and Q602. Now the head rotation solenoid PM901 operates and the worm gear mechanism connectes to the motor, thus the rotary ferrite head ass'y starts to rotate. As the rotary ferrite head has rotated in the amount of the rated angle, the head rotation detection switch S901 turns on and S902 turns off. At this instant, bias voltage is applied to the base of Q603 through S901 and R622. Now Q603 turns to the ON state, Q604 to the OFF state, the head rotation solenoid PM901 releases and the rotary ferrite head ceases to rotate.

The muting voltage for the muting circuit in the playback amplifier is obtained across R644 in the system control circuit (1). In the stop mode and during the rotary ferrite head unit is rotating, i.e., the head rotation solenoid PM901 is energized, Q604 is in the ON state and the emitter voltage of Q604 passes to the bases of Q403 and Q503 through R643, D611 and D619, and the muting circuit operates.

5. Automatic Shut-off Circuit

At the end of the tape in the playback mode, the shut-off switch S903 turns to the OFF position and C611 discharges. Resultant negative-going pulse turns Q603 off and Q604 turns to the OFF state. Consequently, the shut-off solenoid PM902 operates and the function levers release. When the function levers have released, the motor switch S906 turns off, the sensing pole switch S804 turns to the stop position and the B+ voltage mutes the playback amp through the route composed of D620, S804, R641 and D619, and the B+ supply voltage is disconnected from the bias osc unit CP301.

When C611 has completely discharged and the negative pulse has ceased to exist, Q603 turns to the lightly OFF state with the bias voltage applied through R643, D611, R641, D604 and R626. At this condition, the shut-off solenoid PM902 continues holding with the power of Q604 which is reduced by about 20 % of the rated power. Position of the rotary ferrite head ass'y does not change during the automatic shut-off operation.

6. System Control Circuit (2)

The TC-458 uses the tension regulator changeover circuit to release the tension regulator arm of the take-up side when the unit changes its mode from forward playback to reverse playback or from reverse playback to forward playback. The tension regulator circuit is included in the system control circuit (2). The tension regulator has its own power supply and it also takes supply voltage via the sensing pole switch S804 in the forward playback and reverse playback modes. The left-side tension regulator operates in the forward playback mode and the right-side tension regulator operates in the reverse playback mode, and the tension regulator release (L) solenoid PM903 and tension regulator release (R) solenoid PM904 operate respectively and an unnecessary tension regulator is released.

When the forward playback lever is pressed, for example, B+ supply voltage is applied to the system control circuit (2) via the sensing pole switch S804, and Q7 of the tension regulator changeover flip-flop always turns on due to its small base-time-constant and Q6

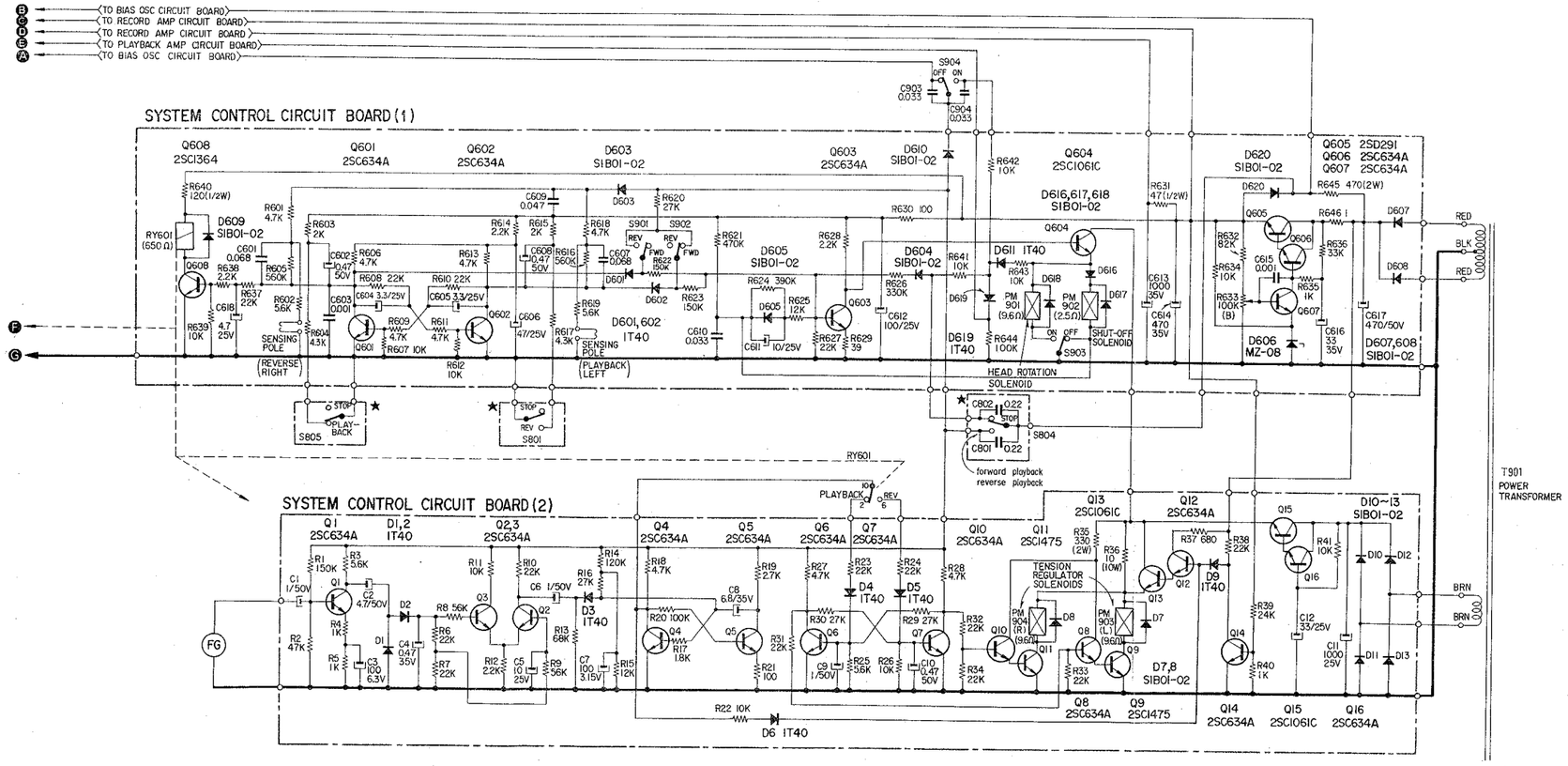

Fig. 3. System Control Circuits (1) and (2)

turns off. Then Q6 turns on and Q7 turns off being triggered by the pulse generated in the monostable multivibrator composed of Q4 and Q5. As the results, drive pulse is obtained at the collector of Q7 and the pulse turns Q10 and the tension-regulator-release-solenoid-driver Q11 on through resistor R32. Now the tension-regulator-release (R)-solenoid PM904 operates and the right-side tension regulator for reverse playback releases. To prevent the tape hunching during the mode change from forward playback to reverse playback, the take-up side tension regulator should release instantly. In the TC-458, the FG(frequency generator) detects the instant the motor stops at which the motor reverses its rotating direction by the operation of the reverse relay RY601 and triggers the tension regulator circuit through C1. The motor stop is used as the triggering reference, because the motor is the standard part for the rotational operation of the unit.

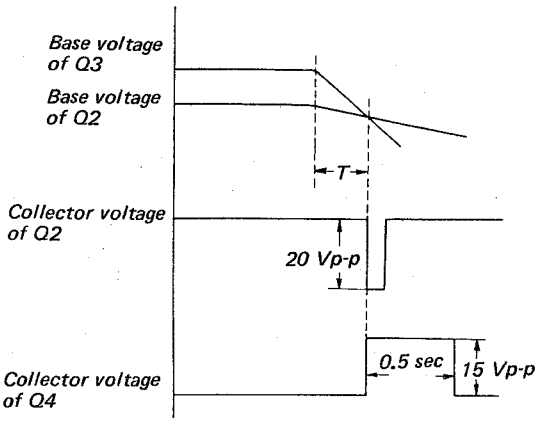

Fig. 4. Pulse generation at motor stop

From Forward Playback Mode to Reverse Playback Mode

When the reverse relay RY601 has turned from forward playback mode to reverse playback mode and during the interval before the motor stops, the output signal of approximately 500 Hz at 19 cm/s (7½ ips) from FG is amplified by Q1 and is rectified by the voltage-doubling rectifier, and approximately 8 V DC is obtained at the cathode of D2. The dc voltage at the cathode of D2 is applied to the bases of Q3 and Q2 through R8, R6 and R9. Approximately 4 V DC is applied to the base of Q2 through the voltage divider composed of R6 and R7, and Q2 is always in the state of OFF due to the common emitter resistor R12.

At the instant the motor stops, no output appears at the collector of Q1 and C4(0.47 μF/35 V) rapidly discharges through R6 and R7. Now C5(10 μF/25 V) in the base circuit of Q2 gradually discharges the base bias voltage. When the base bias of Q2 and Q3 becomes the same voltage due to the capacitor discharges, Q2 temporarily turns on and a negative-going pulse of approximately 20 Vp-p is obtained at the collector of Q2. This negative-going pulse triggers the monostable multivibrator composed of Q4 and Q5, and Q4 turns off for about 0.5-seconds (self-recovery time) and the collector voltage reaches to 15 V DC as shown in Fig. 4. Thus, a pulse of 15 Vp-p and 0.5-second duration is obtained at the collector of Q4 at the instant the motor stops.

The pulse appeared at the collector of Q4 passes to the base of Q7 through the reverse relay RY601 and Q7 turns on. Accordingly Q6 turns off, Q8 and Q9 turn on, and the tension regulator release solenoid PM903 operates. Now the solenoid PM903 releases the take-up side tension regulator. Q12 and Q13 operate the tension-regulator-release-solenoid in two steps. The pulse of 15 Vp-p and 0.5-second duration passes from the collector of Q6 to the base of Q12, and Q13 short-circuites R36 (10 Ω, 10 W) connected in parallel with the tension-regulator-release-solenoid PM903 which is now actuated by a temporarily high-enough voltage and it continues holding with a lower voltage than the actuating one. B+ voltage of higher than 30 V is taken from the power supply in the system control circuit (1) to operate Q12 normally.

Q14 operates in such a manner that it turns Q12 and Q13 to ON to short-circuit R36 to supply a sufficient power for the tension regulator release solenoid's initial operation before the output voltage of the voltage-regulated power supply composed of Q15 and Q16 reaches to the rated value when the forward playback or reverse playback lever is pressed right after the POWER switch is pushed to turn the unit ON.

In about 5 seconds after turning the unit ON, B+ supply voltage reaches to the rated value and Q14 turns on, Q12 and Q13 turn off and R36 operates as a voltage dropper in the circuit, and now the tension regulator release solenoid keeps holding with the lower voltage.